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Society for the Encouragement of Arts, Manufactures, and Commerce.

ADELPHI, LONDON.

ONE-HUNDRED-AND-FOURTH SESSION, 1857-5 .

CATALOGUE

OF THE

TENTH EXHIBITION OF INVENTIONS.

Being Appendix I. to Vol. VI. of the "Journal of the Society of Arts."

LONDON:
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1858.

CATALOGUE

OF THE

TENTH EXHIBITION OF INVENTIONS,

BEING A COLLECTION OF ARTICLES RECENTLY INVENTED, PATENTED, OR REGISTERED,
EXHIBITED AT THE SOCIETY'S HOUSE DURING THE SPRING OF 1858.

N.B.—The Council wish it to be understood that they are not responsible for any of the statements contained in this Catalogue.

ENGINEERING, MINING, RAILWAY MECHANISM, &c.

(*For the remainder of the Articles in this Section, see Drawings.*)

1. **Patent Reciprocating Furnace Bars; John Chanter, Bromley St. Leonard's, Bow-road, E.**

These bars are moved to and fro by a hand lever, fixed to a rocker, which cleans the entire surface of the grate without opening the furnace door. The bars are made in both single and double lengths, as shown in the accompanying illustration of a furnace fitted with the latter kind. The dead plate is formed with slits or openings, which, upon the bars being worked backwards and forwards, are opened and closed, thus giving a sufficient supply of air to the furnace, at the moment the coals are temporarily disturbed for clearing the grate, so as to cause perfect combustion, and prevent smoke.

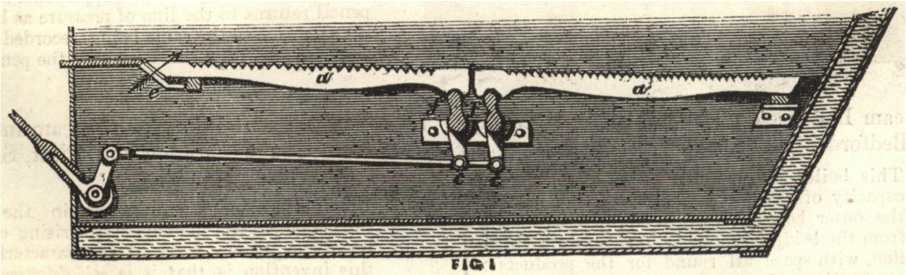


FIG. 1

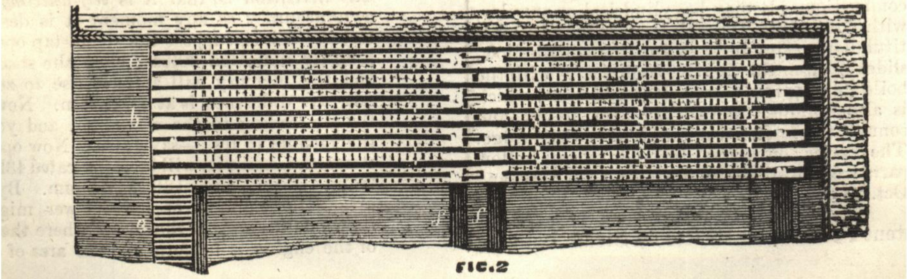
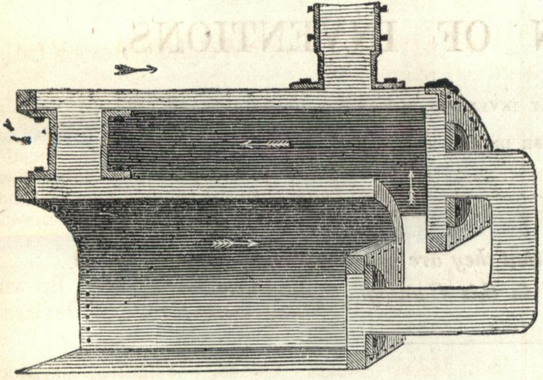
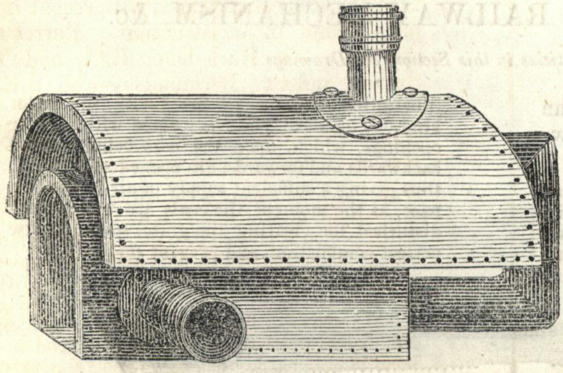


FIG. 2

2. Patent Double-backed Double Boiler; G. and W. Steell, Richmond, Surrey, S.W.

This boiler is formed of two half cylinders, with backs, the top one being longer than the bottom one, and so much larger as to leave a flue between the cylinders; the first cylinder contains the fire, which plays on the back of the bottom part of the boiler, after which it acts on the back of the second, and passes through between the cylinders and returns over the top, by which time the heat is totally exhausted. The two cylinders are attached by the pipe in front between the two, and the backs by a pipe which joins them together, giving all the circulation possible. The socket flange on the top is for the flow, and those at the sides for the return.





3. Steam Boiler; Taylor and Rolfe, Northill, Bedfordshire.

This boiler has a water chamber within the capacity of the flue, and communicating with the outer boiler by means of pipes, extending from the bridge backwards, concentric with the flue, with space all round for the products of combustion. It may be cylindrical or annular, with flue passage through it, or it may be multitubular. The furnace bar frame is hollow, slides in from the front, communicates with the boiler, and is in a piece with the bridge, which is also hollow; the bars are also hollow, and connect the furnace bar frame with the bridge. The water circulates through these hollow parts freely. (See the *Engineer*, Sept. 25th, and Oct. 23rd, 1857.)

4. Patent Feed-water Heater for Steam Boilers; John Randolph Sees, New York. Exhibited by Davies and Hunt, 1, Serle-street, Lincoln's-inn, W.C., and Glasgow.

The feed-water passes through a coil of pipes placed in the breeching or in the smoke box of the boiler, and thus becomes heated; this is stated to effect a saving of 25 per cent. in fuel. There is a check-valve which allows of the circulation being kept up when the feed-pump is not at work.

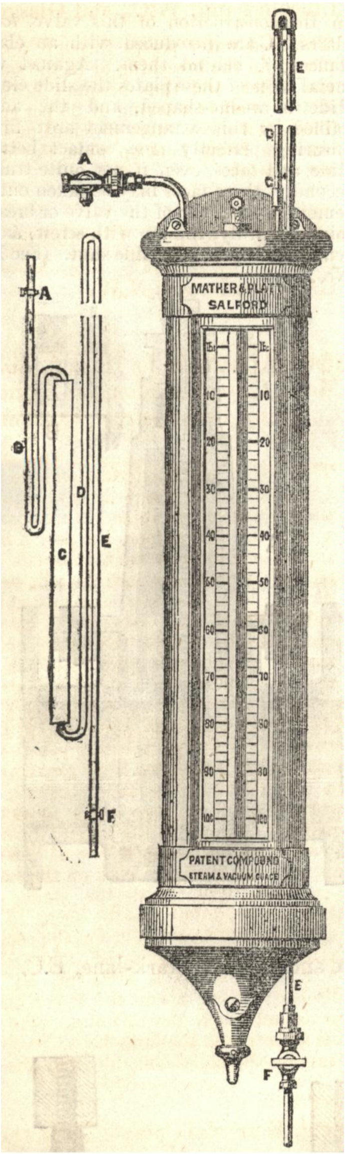
5. Improved Copper Circulating Tubular Boiler; C. Askew, 27½, Charles-street Hampstead-road, N.W.

6. Safety Apparatus for Steam Boilers; W. Mann, City of London Gas Light and Coke Company, Dorset-street, Salisbury-square, E.C.

The object of this invention is to modify the arrangement of the ordinary high and low-water guage cocks in such a manner as to keep a constant check upon the person in charge of the boilers, and to cause at intervals, say of half an hour, a pointer to indicate whether the cocks have or have not been examined at such intervals. The guage cocks (in this case three) are connected by a pipe, the upper end of which leads to the pressure cylinder of the registering apparatus containing a piston and spring, which spring only allows the piston to move in proportion to the pressure it receives from the steam; consequently the point of the pencil or tracer is preserved at a distance from zero corresponding to the number of pounds pressure, until the stoker uses the guage cocks to ascertain the quantity of water in the boiler; he commences by shutting off the upper one of the three, and opening the discharge cock on the lower end of the pipe; this allows the steam contained therein to rush out, and the spring to return the piston to a position that brings the pencil to zero. After the stoker has satisfied himself that the quantity of water is sufficient, he shuts the discharge cock, opens the upper one, and the pencil returns to the line of pressure as before; his attention to the same being recorded at the time by the radial line drawn by the pencil.

7. Patent Mercurial Compound Steam and Vacuum Guage; Mather and Platt, Salford Iron Works, Manchester.

In this guage the mercury in the glass tube balances the mercury in the rising column when the pressure is on. One characteristic of this invention is, that it is *self-detecting* of its own accuracy at any moment it is desired to test it. Thus, suppose the steam-tap open, the pressure indicated 30lbs.; close the steam-tap, and the mercury will at once rise to zero; if not, the difference is at once seen. Now open the tap leading to the condenser, and you get the vacuum in lbs.,—say 13lbs. Now open the steam-tap, and you will have indicated 43lbs.,—30lbs. steam, and 13lbs. vacuum. By this means the number of horse-power might be shown on the scale of the guage, where the speed of the engine is uniform and the area of cylinder calculated for, if the steam be taken between the throttle valve and cylinder.



(A) Steam inlet three-way tap. (B) A small syphon to contain water to prevent steam coming in direct contact with the glass tube (C). (D) the rising column for the mercury to ascend as the pressure increases (this column must be 2 inches long for each pound pressure). (E) Tube leading from the top of the column to the condenser. (F) A three-way tap, so that when it is closed to the condenser it may be open to the atmosphere to allow a balance of mercury.

8. Pressure Guage; J. Allen, Boston, U.S.A. Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C., and Glasgow.

The peculiarities of this guage are the combination of a piston and flexible diaphragm, with a bow or hoop spring and rack and pinion; the use of a cup-shaped flexible diaphragm, contained within a spheroidal chamber for giving motion to the indicator, and the use for the same purpose of a helical spring, of a dome or cup shape, in combination with a capsule of vulcanized india-rubber. These guages may be applied either as vacuum or pressure guages.

9. Hot or Cold Blast Indicator or Pressure Guage; Joseph Cadman, Bridgend, Glamorganshire.

This instrument is intended to indicate the blast at the furnace tuyere, as well as the loss from leakage, &c., in the air pipes. This is effected by a valve in connection with a steelyard, graduated and weighted in the usual manner.

10. Blast Whistle with Weights; Joseph Cadman.

In this instrument the weights on the valve stem represent the lbs. pressure, or pillar of blast required by the manager, and the whistle is so arranged as to sound the alarm only when the blast is less than the required pressure, and thereby becomes a tell-tale against the engineer.

11. Improved Steam Engine Governor; Brown and May, North Wilts Foundry, Devizes.

12. Metal Steam Cocks, Whistles, Water Guages, and other Cocks, with recent improvements in construction. Perreaux and Co., 39, Mark-lane, E.C., and T. Suffield and Co., Bermondsey-wall, S.E.

13. Patent Self-acting Safety Valve and Spigot. Daniel D. Daly, Tuckey-street, Cork.

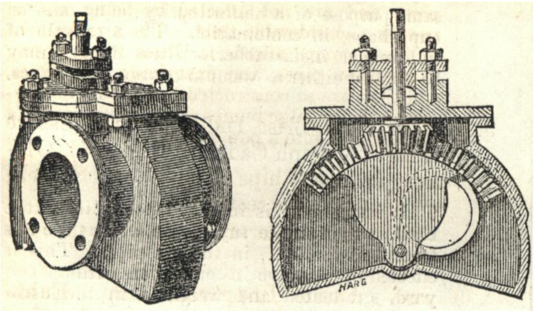
This valve consists of a cylindrical flanged cap, the bottom of which serves as the seat of the valve, which is pressed into its place by a spiral spring fitting round the stem and forced downward by a cap screwed into the upper end of the cylinder, having two small holes bored through it. The stem of the valve rises above this cap, and has an eyelet hole to admit the end of a lever for the purpose of raising the valve externally to admit air.

14. Slide Valve; W. E. Ellis, Vulcan Foundry, Warrington.

Valves are placed between the steam and exhaust ports in this slide valve, which are worked by the admission of the steam by the slider. In consequence of this there is no premature compression or exhaustion, however great the lap may be, and the exhaust is thrown fully open at once.

15. Patent Sluice Valve; Brown and May, North Wilts Foundry, Devizes.

This sluice cock is opened by a bevel pinion working into a toothed rack, cast on the back of the sluice, and is constructed so that one turn of the spindle will completely open it. When closed, the faces (either brass or iron) are forced into contact by a wedge on the back of the sluice.



16. Hydrant, for Connection with Street Mains; W. S. Wheatcroft and J. N. Smith, 34, Brazenose-street, Manchester.

17. Model of Hydrant, showing the action of the disc, and the form of the valve; W. S. Wheatcroft and J. N. Smith.

The vulcanized packing-spring on this model has been subjected to compression and immersion in water for eight days.

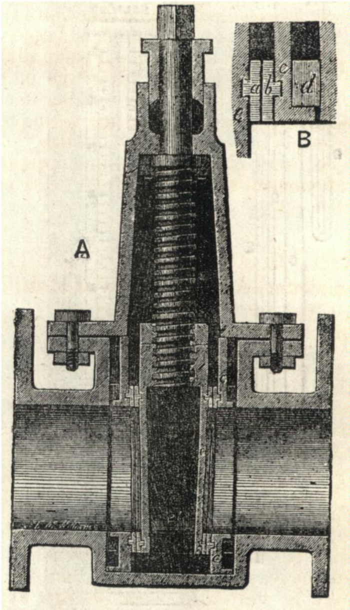
18. Model of Water Tap; W. S. Wheatcroft and J. N. Smith.

This tap has a valve similar to the above hydrant.

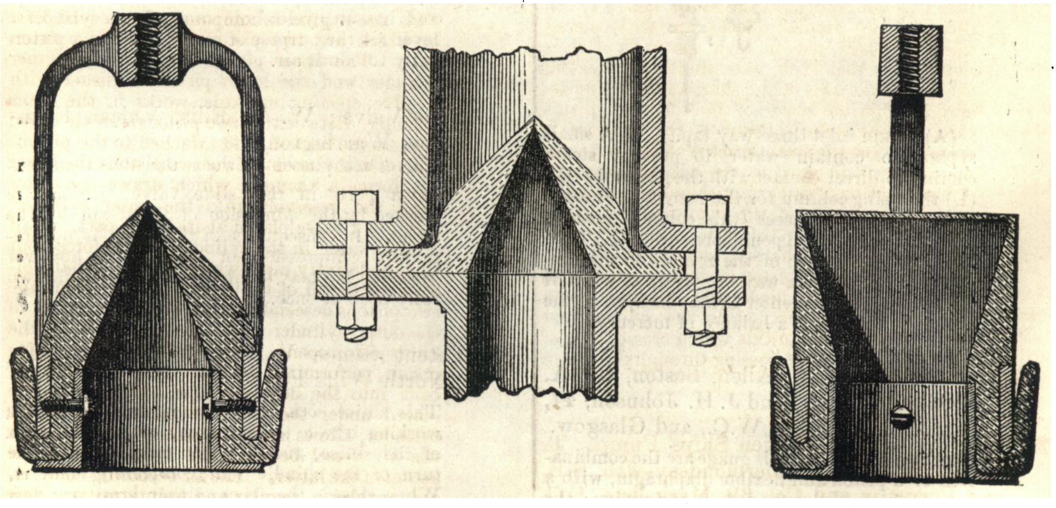
19. Sectional Model of an Iron Tap; W. S. Wheatcroft and J. N. Smith.

20. Patent Slide Valve; Charles Botten and Son, Crawford-passage, Ray-street, Clerkenwell, E.C.

In the construction of this valve, *loose* faced plates C C are introduced, with an elastic substance *f f*, behind them. Against the gun-metal faces of these plates the slide closes. The slide is wedge-shaped, and the advantages gained by this arrangement are: firstly, the ensuring perfectly true contact between the slide and faces, even if not quite truly fitted; secondly, these faces may be taken out without removing the body of the valve or breaking the joints; thirdly, the top with screw, &c., can be removed, leaving the slide shut. (See Drawing, No. 313.)



21. Patent India Rubber Pump Valve; Perreaux and Co., 39, Mark-lane, E.C.



These valves are constructed entirely of India Rubber, vulcanized for the purpose, and take the form of a tube flattened at one extremity, something similar to the mouth-piece of a hautbois, and approaching as nearly as possible in form and action the valves contained in the human heart. The thickness of the sides of the upper part diminishes gradually to the top, where the two sides meet and form lips, which, when the valve is in a state of rest, are in close contact, and prevent the downward passage of the fluid. With any upward pressure the lips freely separate and allow of the upward passage of the fluid. The gradual tapering of the sides forming the lips of the passage, enables the valve to open and close with the slightest variation of pressure, and, by properly proportioning, to resist any required amount of downward pressure. The passage for the fluid is larger in these valves than in any others of equal dimensions; They also possess the advantage of having a "clear way," there being nothing to retard the passage of water, and owing to the self-acting principle imparted by the elasticity of the material, they close perfectly and instantaneously the moment the pressure from below ceases.

22. Patent Rotary Engine; Carl Heinrich Schroder, Altona, Duchy of Holstein. Exhibited by Davies and Hunt.

The principal novelty in this invention consists in placing the cylinder or steam space (in which the piston and shaft revolve) with its axis at an angle of more or less inclination to the axis of the shaft and piston, instead of their axes being coincident, as is usually the case; the said steam space being divided into two equal parts in a diagonal direction, by means of a circular disc placed at right angles to the axis of the shaft, and provided with an opening through which a solid piston fitting the steam space works. The engine may be arranged so that the cylinder may be stationary, with the disc attached to the shaft, which passes through stuffing boxes placed at an angle with the axis of the cylinder, in which case the piston moves round the shaft with the disc; or the cylinder and disc may both be stationary, in which instance the interior of the cylinder must be spherical and divided into two hemispherical spaces by means of the disc, and two circular blocks are to be placed upon the shaft, one in each space, in such a manner as that their axes shall coincide, and shall cross the axis of the shaft at an angle passing through the centre of the sphere. In this case, although the interior of the cylinder is spherical, yet the steam space revolves as it were upon an axis diagonal to the axis of the shaft. A modification of this arrangement may be made wherein the whole of the engine and cylinder revolve together. In this latter case the interior of the cylinder is spherical, and the two circular blocks with a fixed piston or steam stop between them are placed upon and revolve round the axis of the shaft, whilst the cylinder and disc revolve round an axis which crosses that of the shaft at an angle passing through the centre of the sphere.

23. Improved-Double Action Ships' Pumps; T. Suffield and Co., 13, Bermondsey-wall, S.E. and Perreaux and Co., 39, Mark-lane, E.C.

These pumps are fitted with Perreaux' valves, above described. The valves will pass with ease any foreign substance that may enter the suction pipe, and are not affected by being out of use for a considerable time. The arrangement of these pumps affords facilities for cleansing the suction pipes, and examining the valves, and they are so constructed that a pair of common main or bilge pumps can be connected in a few minutes into a powerful fire pump.

24. Single Action Ships' Pump; T. Suffield and Co., and Perreaux and Co.

This pump is on the same principle as the foregoing.

25. Murray's Patent Improved Pump. Exhibited by Thos. Middleton, Engineer, Loman-street, Southwark, S.E.

In this pump the lifts are joined to the chains at right angles, and allow them to pass over a small-tooth pulley at the top and a bend at the bottom, so as to feather the lifts on the return side. This pump is not liable to be choked, as any foreign substance getting between the lift and the barrel would, by a partial back-turn of the chain, be immediately released, the lift folding up, and letting the substance free.

26. Patent Oscillating Pumps; David Falconer, 68, Causeyside-street, Paisley. Agents: Wotherspoon, McKay, and Co., 66, Queen-street, Cheapside, E.C.

The chief feature in these pumps is the flexible chambers of leather or India-rubber. In each chamber there is a valve opening inwards, and communicating with the pipes which descend into the fluid to be raised. A forked pipe is connected with the top of each flexible chamber, having a valve opening upwards, which allows the pressure to act through the pipes, and the fluid to be raised to its required height. The specimens shown illustrate the application of the principle to house, garden, and agricultural purposes.

27. New Fire-engine. Exhibited by L. de Fontainemoreau, 4, South-street, Finsbury, E.C.

This fire-engine is composed of two cylinders, in which are two pistons attached to a piston rod. The upper piston works in the inner cylinder, and the lower piston, furnished with a valve opening upwards, works in the outer cylinder. Between the two pistons is an air vessel open at the bottom, and attached to the piston-rod. On the ascent of the two pistons the lower one forms a vacuum, which draws the water from the reservoir into the outer cylinder, through a valve placed at its lower part. Half of the water in the cylinder is thus forced out of the delivery pipe, whilst the other half follows the ascent of the upper piston. When the two pistons descend, the valve at the bottom of the outer cylinder closes, and the valve of the lower piston opens. During this time the upper piston, performing its stroke, forces the water back into the delivery pipe. A small tube placed under the valve at the bottom of the cylinder, allows a small quantity of air to enter the air vessel between the two pistons on the ascent of the latter. The air becoming compressed, enables a regular and unintermittent flow of water to be obtained. A small hole is made in the middle of the outer cylinder, which hole opens into a tube to carry off the waste air and water to the bottom of the cistern. The rod of the pistons is fixed to a horizontal lever, by which the fire-engine is worked.

28. Tubular Air-Heating Apparatus for the Ventilation of Mines; J. M. Paull, Alston, Cumberland.

This apparatus consists of a series of tubes built into the chimney above the furnace, with one end opening into the mine, and the other into an upcast shaft. By this arrangement all the air, pure or impure, may be brought into contact with the rarifying agent, and even explosive gases, without risk of accident. (See *Mining Journal, Railway and Commercial Gazette*, Jan. 30th, 1858.)

29. Dubrulle's Patent Safety Lamp. Exhibited by J. W. Lord, 32, Boar-lane, Leeds.

The improvement consists in the arrangement for preventing the lamp from being opened without being previously extinguished. This is effected in the following manner:—A male vertical screw is engaged in a nut with a female screw, forming part of the wick-holder, which moves up and down in a slide by turning a button. The wick-holder, when lowered, acts upon the forked extremity of a wire that releases a spiral spring, which, when the lamp was closed, forced its upper extremity into a hole in the diaphragm and prevented its turning; this wire once lowered, the top of the lamp can be taken off, but as the wick-holder has been previously lowered, the flame has been extinguished before it is possible to open the lamp. Instead of employing the screw to raise and lower the wick-holder and compress the spring, the wick-holder can be furnished with a hook-shaped wire, which moves a pinion placed upon a horizontal arm extending beyond the reservoir, and carrying a similar button, and the oil reservoir can by this means be made shallower.

30. Machine to Crush and Dress Metalliferous Slags and Stones; Herbert Mackworth, M. Inst. C.E., Government Inspector of Mines, &c., Clifton Wood House, Bristol.

The refuse slags, cinders, &c., of iron and other smelting furnaces contain variable proportions of metal, which are now thrown away in enormous heaps, and are lost. Those portions of the cinder which contain most metal have the highest specific gravity, which property may be employed to separate the richer from the poorer portions. The cinders should be allowed to run from the furnaces into water to granulate or soften them. They are then filled into the crushing and separating machine, represented by this model. A double row of light *stamp heads* break up the cinders. The steep slope between the two rows of stamp heads allows the fragments passing from the first row of heads to turn over, so as to present their edges to the next row of heads, and be more readily and completely crushed into granular rather than splintery fragments. The cinders then descend into the separator, when a current of water is driven upwards in pulsations by the pump. The particles are arranged by this current in the order of their specific gravities. The lighter portion is pushed over in the shale shoot. The heavier portion can be removed from the door in the lower part of the separator, or allowed to fall into a tank. The addition of an endless feeding band and of a dredger, or Jacob's ladder, to bring up the heavier portions out of the tank, will render the machine self-feeding and self-delivering. The water returns to the pump at each stroke by perforations in the side of the separator. The same machine can be employed for separating the small nodules of clay ironstone from the shale, in which they are imbedded. The shale is cracked by the stamps, but the nodules, being much harder, are not so crushed. Fragments of shale still adhere to the ironstone, and are removed by the rolling over and attrition caused by the revolving arms in the separator, aided by the vertical action of the water. The shale being lightest passes off at the top, the ironstone nodules at the bottom. The crushing and separating can be performed at sixpence to ninepence per ton. This machine is also suitable for separating earth or sand from iron ores of the secondary formation, now much employed in the manufacture of iron. Specimens of shale containing ironstone and of iron slags are exhibited as they exist in the hills of cinders which surround the iron works.

31. Machine for Crushing Shale containing Ironstone: Herbert Mackworth.

In the carboniferous measures interstratified with coal are seams from 1 to 15 feet in thickness of shale, containing from 10 to 50 per cent. of hard nodules of ironstone. These nodules contain from 5 to 10 per cent. more iron than the balls and beds of ironstone usually worked, and will make a superior quality of iron, but are now wholly, or almost wholly, unworked, as machinery has not yet been applied to effect the separation of the ironstone. Many of these seams can be quarried at the out-crop. Other iron ores also occur in a pisolitic form, and require separation from the matrix in which they are imbedded. The rollers represented in the model break up or crack the shale in four directions, without injuring the nodules of ironstone. Instead of the ordinary counter-balance weight, the rollers are held together by vulcanized india-rubber cords, or other springs. By a cord of caoutchouc, three inches in diameter, consisting of many small cords, a pressure of four tons can be conveniently given. When a large lump of ironstone enters by accident the elastic cords allow the rollers to separate and pass the lump without fracturing the axis of the roller. The ironstone nodules may be separated at once from the shale by the separator, represented in the preceding model.

32. Coal Purifer; Herbert Mackworth.

This model represents a more perfect form of coal purifier than those applied by the patentee in the coal districts of England and Belgium. Coal, especially small coal, contains a quantity of shale and pyrites, amounting frequently to 10 per cent. The pyrites contains the whole of the sulphur in coal. In order to separate these impurities, which greatly deteriorate its value for all purposes, the coal is brought by an endless band (not shown in the model) in a continuous stream into the coal shoot. As the coal falls from this shoot in a broad thin shower, a current of air passing to the fan removes the fine light dust, which would, if allowed to enter the water separator, absorb too much water. As shale is specifically heavier than coal, and is not so friable, the fine dust thus separated by air is almost perfectly pure coal. The rest of the coal falls into one side of the separator marked rough coal, where vertical currents or pulsations of water are driven up through it by the piston and its valves, which open downwards. As the coal and shale rise and fall by this current of water, they slide up and down against a perforated division of the separator, and the finer particles pass through the holes into a second division, where the current of water is more gentle and regulated to the finer particles by the current regulator or shutter. The shale settles to the bottom of the separator, and passes through valves into the shale box, out of which it can be removed in a continuous stream by a small dredger (not shown in the model). The pure coal remains at the top of the separator, and is carried forward by the blades or rakes attached to the perforated wire endless band. These blades raise the coal out of the water in order to let the latter drain off, and then discharge it down a shoot into a train placed to receive it. As the purified coal descends the shoot, the fine dry coal dust before mentioned is driven on to it by the fan in a continuous shower, and the per centage of moisture in the whole mass is small. The water flows upwards through the wire guage which acts as a filter to keep back the coal, but it does not get clogged as it is in motion, and a fresh surface is continually presented. The filtered water flows back by a side channel on to the piston, so that there is no waste of water. The endless wire band presses on longitudinal brushes, which prevent the water passing from one compartment to another, except through the wire filter. The machine is nearly automatic, feeds itself, and delivers its purified coal into one train, and its shale and pyrites into another. The attention of the man working it has to be simply directed to prevent too much shale collecting in the separator and passing over with the coal. This he regulates by opening the shale more or less. The machine divides the coal into three parts, and, after separating the particles according to specific gravity, reunites them. There is no water or coal wasted. The cost of separating coal from its impurities, by this machine, is from 2d. to 3d. per ton, including all expenses of engine power, attendance, &c.

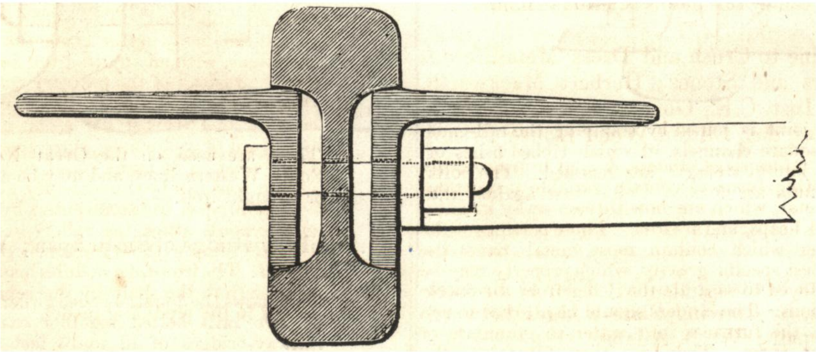
33. Specimen of Shale Ironstone; Herbert Mackworth.

34. Specimens of Iron Slags; Herbert Mackworth.

35. Improved Trap Door for Mines and Collieries; Robert Rennie, Netherwood, near Cumbernauld, Dumbartonshire.

This door is connected with a lever, which may be either vertical or horizontal, the connection being made by means of an endless wire-rope, or by tie-rods. This lever is acted upon by the waggon, and opens the door, allowing the waggon to pass through; a second lever on the other side of the door closes it in a similar manner. The models show the two different arrangements.

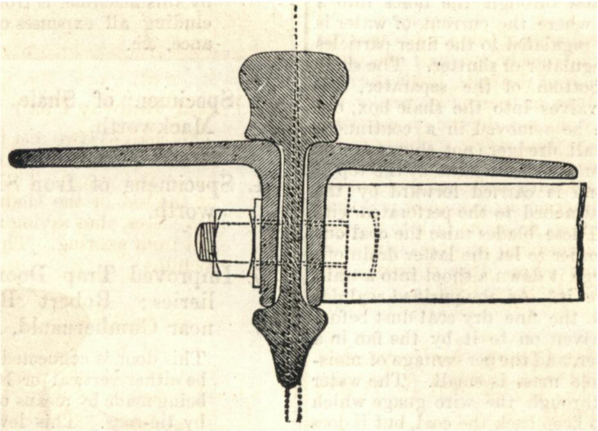
36. Patent Suspended Girder Rail; W. Bridges Adams, 1, Adam-street, Adelphi.



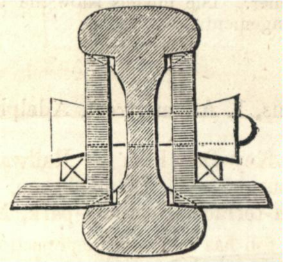
This rail is arranged to remedy the defects in the ordinary arrangement. In the double-headed rail, as applied on the London and North Western Railway—the whole is of wrought iron, in four types or parts—the rail which may be single or double-headed; the angle bracket; the belt; the tie or guage-bar, the length of which determines the guage. The rail is 7 inches in depth; the angle-brackets spread to a width of 13 inches, and each joint, whether of rail or bracket, is intersected by two solids, and the tread of the rail is only 2½ inches above the bearing surface on the ballast, being equivalent, in bearing area, to a cross sleeper-road, with the sleepers spaced 2 feet 6 inches apart. Thus the rail, 7 inches deep, has nearly twice the vertical strength of the common rail, the squares of the depths being as 49 to 25; the horizontal strength, by reason of the angle-brackets, is increased manifold. This rail being double-headed, and not liable to damage by being placed on chairs, it may be turned upside down and end for end. The specimen shown is produced by the Ebbw Vale Company.

37. Single-headed Girder Rail; W. B. Adams.

This specimen is similar to those used on the Bombay and Barroda Railway. The depth of rail is the same as the double-headed rail; the total width is 12 inches. It was produced by the Rhymney Company. These systems of rails require no skilled labour to lay down, either on ballast or on natural ground. They require little maintenance, lying steady, and possessing the same mechanical elements of stability as a well-built ship, broad beam, deep keel, and no top hamper. As the bearing is on the surface of the ballast the moisture in the earth or ballast is forced upwards, instead of lying in pools below; and, calculating by the quantity of ballast used in the cross sleeper-road, one half the amount will serve for the girder-rail. In maintenance the ordinary "beating" is not required; the rail is lifted, when necessary, by a long lever passed below it, in the form of a long wave, without bending at the joints, and the ballast is shovelled under it. The bolts do not get loose, being embedded in the solid ballast, and the rail is, at the same time, sufficiently elastic to prevent rigidity at high speeds by a slight vertical yielding of the angle-brackets.

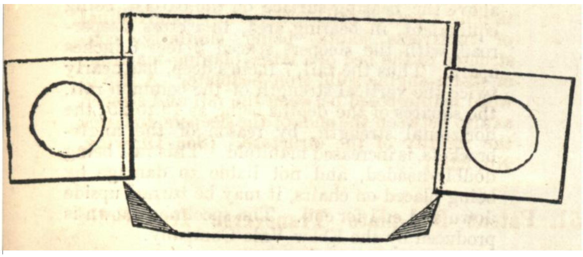


38. Improved Fish Joint; W. B. Adams.

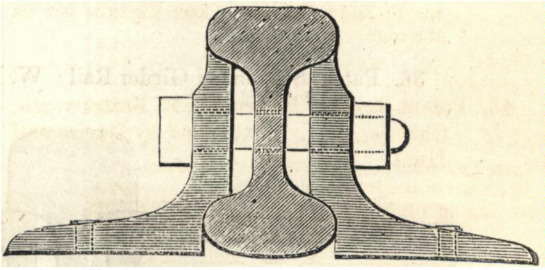


This joint is joined by stamping the rail-ends into square channels, in which ribbed fishes of great lateral strength are recessed. The bolts and nuts are formed to key fast against the ribs.

39. Mode of Securing ordinary Fish or Bracket Bolts, by drawing Plate-wedges between each pair; W. B. Adams.



40. Bracket Joint for ordinary Double-headed Rails; W. B. Adams.



These are used on the Great Northern and South Western lines, and may be either in cast or wrought iron.

41. Railway Bridge of Small Span; W. Bridges Adams.

This shows the double-headed girder rail, formed by two rails bolted together externally, for railway-bridges of 12 to 15 feet span. This completes the whole bridge structure, with rails included, and only requires to be laid upon the abutments of stone or timber on either side of the opening.

42. Patent Wrought-iron Railway Chair; Chas. Robert Moate, 65, Old Broad-street, City, E.C.

This invention consists in holding the rails by a chair rolled in two pieces, of such a form as that each half of the chair may receive the lower flange of the rail on either side, the jaws of the two portions of the chair being bolted together through the middle portion of the rail.

43. Patent Railway Chair; R. J. Badge, Manchester.

This chair is constructed in two pieces, having the joint under the rail. The rails are fixed to the chairs by screw bolts running through them. (See Drawing, No. 322.)

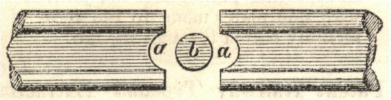
44. Patent Cotter-joint Chair; R. Taylor and R. Worswick, Ipswich, and J. Lovatt, Sudbury.

The principal peculiarity of this joint is that the cotter passing transversely through the chair and slots in the ends of the rails, holds the rails firmly on the bottom or bearing surface of the chair, so that they do not depend on side keys or wedges to prevent their rising. This prevents the rails sliding or creeping through the chair, at the same time allowing sufficient freedom for expansion or contraction on change of temperature. The wood keys press the rails to the side of the chair, thus ensuring an even joint both on the surface and edge. (See *Practical Mechanics' Journal* for January, 1858.)

45. Patent Cotter Joint Clutch, for suspended joints in rails; R. Taylor and R. Worswick, and J. Lovatt.

The principal peculiarity of this joint is that the cotter passing transversely through the clutch and beneath the ends of the rails, prevents vertical play, whilst there is sufficient freedom for expansion or contraction. The bolts through the lip and rails serve to keep the rails fair on the edge.

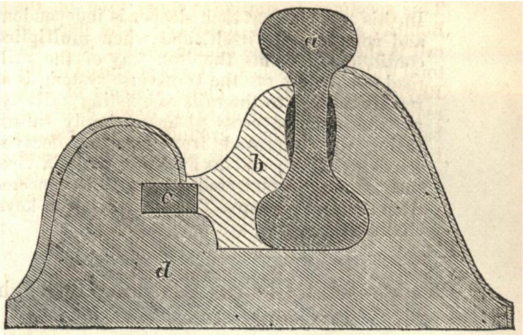
46. Patent Railway Fastening; R. Butterworth, Chelsea, S.W. Exhibited by Davies and Hunt,



In the end of each rail a semi-circular notch is cut in the web of the rail, so that when the ends of the rails are placed together the two notches form a circular hole. In this hole a circular key, *b*, of wrought or cast iron is placed, the said key being the same thickness as the web of the rail. When the joint is supported in a chair the ordinary wooden key keeps the circular key in its place.

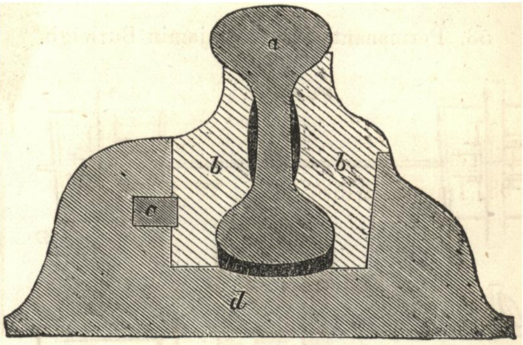
47. Patent Railway Fish Joint Chair; J. Nickless, Coalbrook-dale, Shropshire.

The peculiarity in this joint chair is, that it affords vertical and lateral support to the rails; this is effected in the following manner:—A fish piece of cast iron is wedged between the rails and the ears, by means of a horizontal wedge; the wedge, being made of wrought iron, is partly split, so that by opening or clinching it, it will remain immoveable.



48. Patent Railway Chair; J. Nickless.

This chair has two cast iron fish pieces which are lifted out with the rail, being wedged with a horizontal wedge. The rails, instead of resting on the bed of the chair, rest on the top of the fish pieces, thus saving the lower portion of the rail from wearing. This chair is cast without a chill.



49. Patent Key Dog Fish for Railway Joints; Honourable W. E. Cochrane, 5, Osnaburgh-terrace, Regent's-park, N.W.

This fish has two or more projections upon it, which fit into corresponding holes in the rails. The fish is secured in the chair by means of a key. This chair has been used on the South Western Railway.

50. Patent Continuous Bed-plate Iron Solid Sleeper Roadway; Thos. Wright & Co., 9, George-yard, Lombard-street, E.C.

The distinguishing feature of this invention is the employment of a single sleeper, as a complete piece of roadway in itself, consisting of one compact and solid mass of iron, capable of sustaining a pair of rails without any longitudinal or transverse joints, being similarly constructed to the bed of a lathe, planing-machine, or steam-engine solid iron bedplate. A slip of wood is interposed between the rail and sleeper, as also between the ends of the sleepers, to lessen the rigidity of the structure. (See Drawing, No. 328.)

51. Patent Bed-plate Transverse Iron Solid

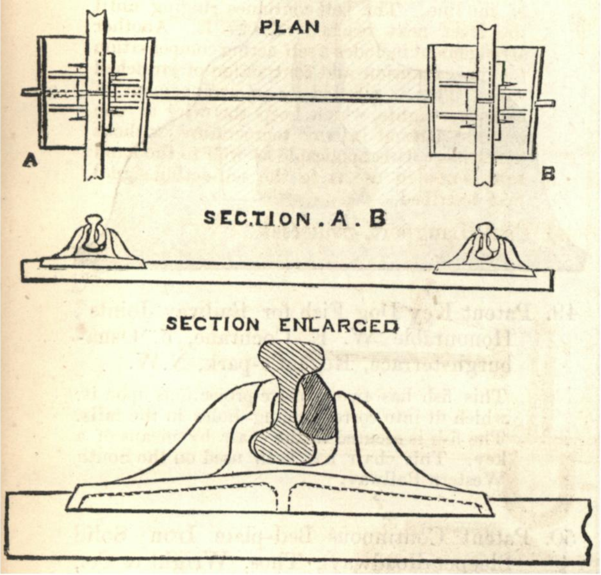
Sleeper, with the Vice-jaw Rail Fastening; Thos. Wright and Co.

In this arrangement each sleeper is independent and complete in itself, and when multiplied continuously, forms the iron way of the railroad, and being on the transverse system, is as readily applied to the rails of existing railways as the common cross sleeper, simply substituting the improved iron for the decayed wooden sleeper; and (as by the action of a vice) the rails are connected to and disconnected from them, at pleasure. The wooden or iron keys, chairs, spikes, &c., are superseded.

52. Wedge-Joint Chair; Benjamin Burleigh, 26, Great George-street, S.W.

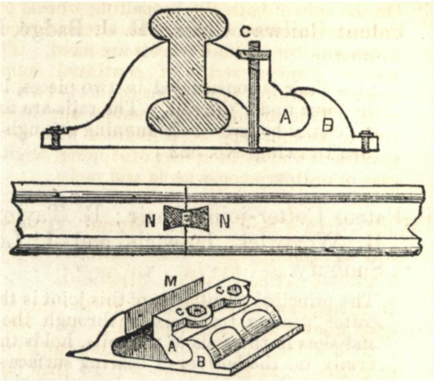
This is a long and heavy chair, with a long cast-iron wedge or an elastic wrought-iron key, fitted on one side in the channel of the rails, and on the other bearing against the jaw of the chair, low down, so as to put very little breaking strain upon it. The angle is very acute, and the keys are placed in the chairs in such a direction that the action of the trains tends to tighten them. This chair has been in use on the Great Northern Railway for two years.

53. Permanent Way; Benjamin Burleigh.



The cast wedge chair above described is formed into a cast sleeper by extending the base, which presents a wedge form on the plan. Opposite chair sleepers are connected by a wrought-iron tie bar, which wedges upon the sleepers, and serves as a tie to strengthen each sleeper while keeping it in position. Thus the whole system of fastening is so arranged by wedges, that the motion of the trains tends to tighten them. The rails are of the usual double-headed section. As a variation these chair sleepers are sometimes used with an elastic wrought-iron key, made to expand in the driving against a wedge-shaped lip on the jaw of the chair. This Permanent Way has been in use for two years.

54. Improved Fish Joint; W. H. Myers, 202, Whitechapel-road, E.



C Bolt and Nut. A Knuckle piece. B Raised piece.
M Opening for rail. NN End of rails. E Dove-tail piece.

This chair is made suitable to fit the rail in the ordinary manner on the inside; on the outside is cast a raised piece, which is grooved or hollowed out circular across the entire length of the chair, to receive a circular knuckle piece, which acts or works in the groove or hollow formed in the chair; into the chair are inserted one or more bolts with their heads recessed into the bottom of the chair, which, passing through the bottom of the chair and circular knuckle piece, are fastened with nuts on the top, as shown in the woodcut. The joint of the rail is fished by means of a female dovetail, slightly bevilled, cut in the end of each rail, into which is placed a male dove-tail piece, also slightly bevilled to fit the female dove-tail in the ends, which, by aid of the chair before described are held firmly together at their junction.

55. Fish Plate for Permanent Way of Railways; James Murphy, C.E., Newport, Monmouthshire. Exhibited by John Gedge, 4, Wellington-street South, W.C.

This differs from ordinary fish plates, by having a supporting plate under the joint of the rails, with side plates made to the form of rail and securely bolted through the rail.

56. Patent Railway Treenail Extractor, and Improved Patent Treenails; R. J. Badge, Manchester. Exhibited by Ransomes & Sims, Ipswich.

To withdraw an ordinary treenail, a coarse-threaded screw, having an eye at its upper end, is inserted into the head of the treenail. This eye is attached by a short pin to the lower end of the extractor, when by turning the lever at its upper end the treenail is safely withdrawn. In the case of withdrawing Badge's Improved Treenail it will be only necessary to attach the eye of the iron parallel key to the Extractor, and this key being withdrawn, the wooden portions of the treenail may be removed easily by hand. The improvement in the treenails consists in having a slot cut in the direction of their length, into which an iron key of parallel thickness is firmly driven, after the wooden treenail shall have been driven into its place.

57. Patent Ascending Apparatus; De Cristoforis, 63, Regent-street, W.

On the side of both the propelling wheels of an ordinary locomotive, near the circumference, a given number of small wheels are fixed. These wheels form a series of continual supports against a series of projections connected with the rails. This arrangement enables the locomotive to ascend very steep inclines with perfect steadiness and without fear of ripping, as in the case of ordinary cog-wheels and racks.

58. Whitworth's Self-acting Signal Apparatus and Announcing Bell. Exhibited by B. Vickers, Atlas Works, Sheffield.

In this apparatus the wheels of the engine act upon a lever arm, and depress it. This releases a catch in connection with a sliding bar attached to a balance weight. The weight then falling causes the "danger" signal to be shown, and, at the same time, a bell to be rung. If the danger signal is required for shunting a train, the pointsman has only to turn the windlass somewhat further than is requisite for setting the apparatus for the ordinary signal, and this causes an erection on the sliding bar to press on a double lever, which, lifting up a vertical catch, releases the slide, and thus permits the weight to act on the signal.

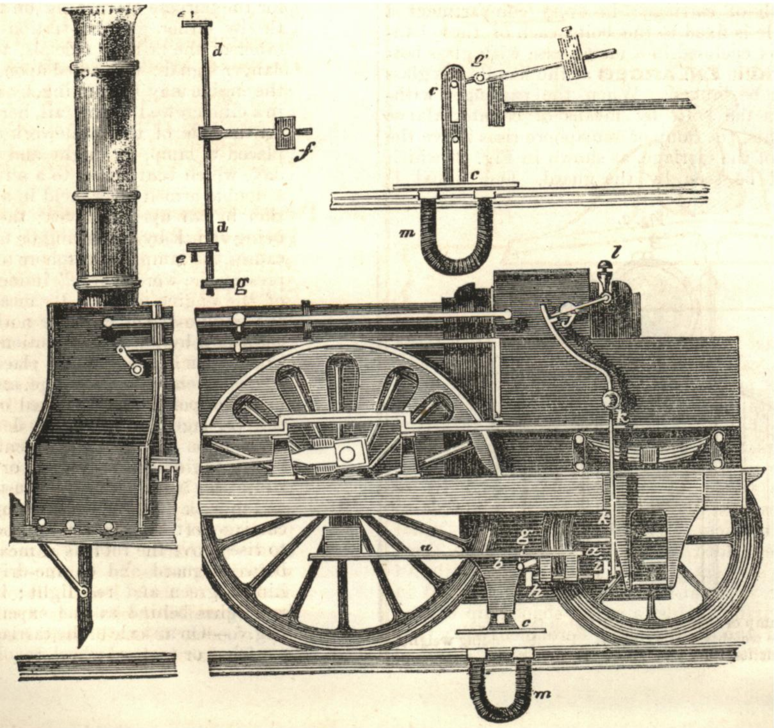
59. Patent Switch Point and Signal Controller, for Railway Junctions; John Harrisson, 3, High-street, Homerton, N.E.

This invention consists in connecting the signals with the switch levers, so that the act of setting the switch throws the signals into such a position as to prevent any train advancing but that for which the switch is set. The signals, when left to themselves, are kept elevated at danger, by means of weights on the horizontal arms of bell-crank levers, and, when the switch lever is placed in one or other direction for setting the points, the rod is drawn through the eye of the one bell crank lever, while a stop is brought into contact with the other, raising the weight and allowing the signal to descend. This rod, being attached to the switch lever by a clutch, can be instantaneously disconnected.

60. Gibson's Patent Self-acting Railway Signal and Telegraph; Young and Pool, Hull.

In this system of signalling, the wheel of the engine, in passing over and depressing a gently inclined lever fixed to the rail, causes the signal-post connected with it to turn to a position at right angles to the line, and thus to indicate "danger" to the driver of the following train. The post remains in this position until the first train has safely progressed a certain distance (say 1,000 or 1,500 yards), when, by the depression of a similar lever, opposite another post, the first signal is altered to "all right," and the second at the same moment indicates "danger," to be in turn released by the third, and so on. The depression of the lever previously mentioned will, when so arranged, cause an electric bell to ring at any station or stations either in advance or in the rear of the moving train, which will thus announce its own approach to, or departure from, any station, tunnel, curve, or other dangerous part of the line. The bell continues ringing until the lever next reached releases it. Another arrangement includes a self-acting compensation for the expansion and contraction of stretched wire. This is effected by an arrangement of balance weights, which keep the wire at one uniform tension in any temperature, without attention. It is applicable as well to the hand signals now in use as to the self-acting signal first described.

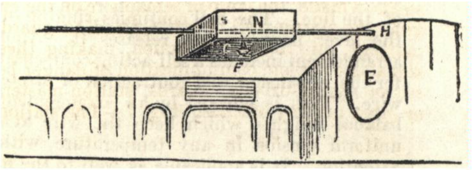
61. Patent Railway Signals; W. Bond Paul, Langport, Somerset.



This invention consists in placing along a line of railway, and at such distances from each other as may be found desirable, electro-magnets fixed near to the rails, which, when in action, on the passing of a train, attract a lever attached to the engine, and so placed as to be brought near to the poles of the magnets. This lever, being drawn towards the magnets, on coming within their influence, opens a communication between the steam reservoir of the engine and a whistle. At the stations which the trains run from, a galvanic battery is placed, and from this battery proceed two wires to the next station—one from the positive, and the other from the negative pole. One of these wires passes around or communicates with all the electro-magnets in succession, and, consequently, if the circuit be completed—which may be readily done at any part of the line by placing an electric conductor in contact with two wires—those electro-magnets which are between the points of contact and the battery are at once rendered operative.

62. Signals for Trains in Motion; W. H. Myers, 202, Whitechapel-road, E.

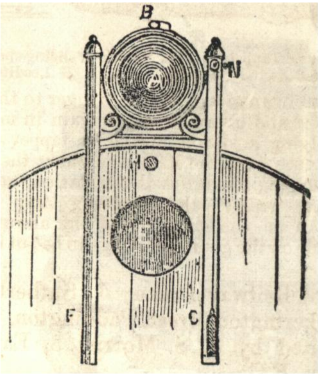
Fig. 1.



H Enclosed Bolt. F Bolt Handle. N Metal Case. C Glass at bottom of Case. E Circular Window.

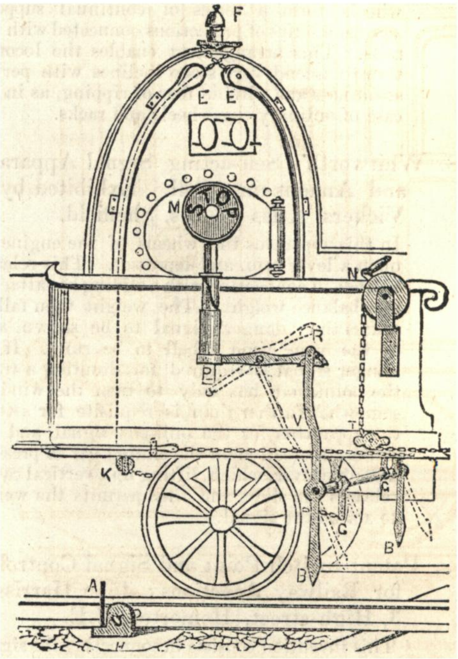
These signals can be applied separately or in conjunction with each other, and may be thus described. The passengers' lamp and semaphore signal, as shown in Fig. 2, is put in action by an enclosed bolt fixed to the roof the whole length of carriage; in every compartment a handle is fixed to the bolt; each of these handles is enclosed in a metal case with glass bottom, as in Fig. 1; to get at the handle the glass must be broken. When the passenger withdraws the bolt, by means of counterbalance weights, the lamp or semaphore rises above the roof of the carriage, as shown in Fig. 2, which could be seen by the guard. One signal i sufficient for a carriage. At night, the lamp being down opposite the circular window will give light inside the carriage, serving two purposes at one expense. Fig 3.—Under the foot-plate of the engine a small shaft is fitted, on which the pendant and other levers are fixed for the purpose of turning on the engine whistle by either guards, station-masters, or any other of the railway officials, acting as a fog or danger signal; it is acted upon, whichever way the engine may be running, by a spring or tappet in a clip screwed to the rail, hereafter described. At the side of the framework of the engine is placed a lamp for night and a semaphore for day, which is attached to a screw supported by a double-armed lever, held in a horizontal position by an upright lever; the pendant lever being struck by the spring or tappet of the clip causes the lamp or semaphore to turn round and present the word "STOP" immediately in sight of the engine-driver. By means of the wheel the engine-driver can give notice of danger to the guard by putting in motion an alarum-bell, as shown in Fig. 4, which is placed in the guard's compartment of the carriage, and acted upon by means of pendent levers fixed on a shaft under the carriage; the pendent levers being also acted upon by the before-mentioned clip; and by the engine-driver's wheel, or station-master's sliding-spring, Fig. 7. The usual lamps placed at the back of the guard's compartment of the carriage, as the last carriage of the train, are made to rise above the roof as a means of signalling between guard and engine-driver, showing to him a green and red light; it has the usual red lights behind at one expense for lighting. Fig. 5.—On an axle of the carriage wheel is fixed a ratchet or toothed wheel, revolving as the car-

Fig. 2.



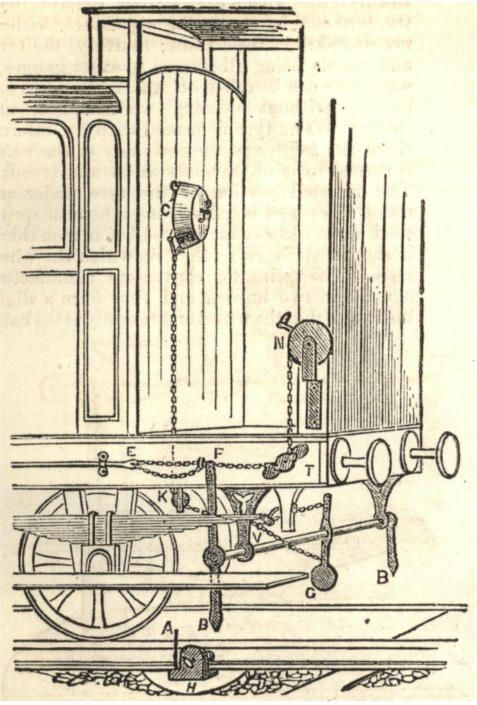
A Lamp or Semaphore. B Catch for Bolt.
C Counterbalance weights. E Window. F Tube holding weights.
N Friction Pulley in Tube. H Bolt Case.

Fig. 3.



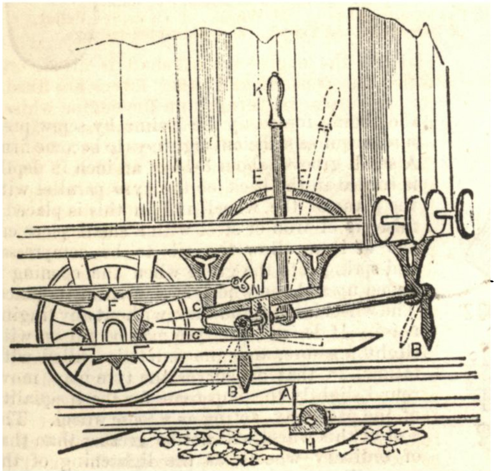
F Steam Whistle. EE Tubes with friction pulleys and chains.
K Leading Pulley. GG Levers. BB Pendant Levers.
V Upright Lever. M Semaphore or Lamp.
R Double-armed Lever. N Wheel. T Chain and Pulley.
A Screw Clip and Tappet. H Opening for drainage.

Fig. 4.



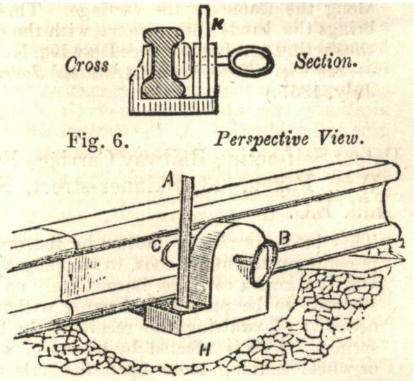
C Alarum Bell. K Leading Pulley. V Chain Junction. Counterbalance Lever. BB Pendant Levers. F Upright Lever. N Wheel. T Leading Pulley. E Connecting Rod.

Fig. 5.



F Ratchet or Toothed Wheel. CC Springs. K Handle with Lever. BB Pendant Levers. EE Quadrant with Catch. N Small Double-armed lever.

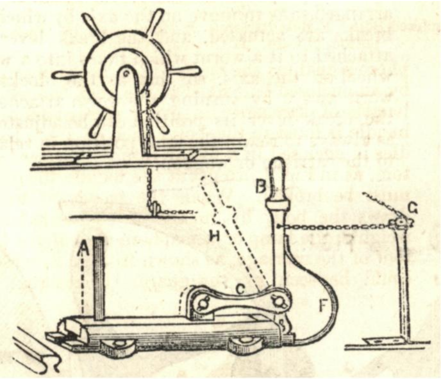
riage proceeds, which is acted upon by means of two springs, over which the guard has perfect control by means of the lever with handle in his compartment of carriage; this ratchet can also be used by the engine-driver by his wheel, and by any other railway official by the screw-clip, on both sides of the carriage. It is calculated that this toothed-wheel would make a rattling noise of greater power than the steam-whistle; it would be quite sufficient to attract the engine-driver's attention, and could be mistaken for no other sound. The communication between guard and engine-driver is effected by rods and chains working through friction pulleys or screw eyes fixed to the carriages.



A Spring or Tappet. B Screw. C Wedge. H Opening for Drainage.

Fig. 6.—The fog or accident screw-clip with spring or tappet is intended to grip the lower flange of the rails by means of a screw, at any of the openings already made for the purpose of drainage between the sleepers. Upon the pendent levers on the engine and carriage striking against the spring or tappet, they will put the steam-whistle, the lamp or semaphore on the engine, the alarum-bell or rattle fitted to guard's carriage, into immediate action, making these signals a complete communication of danger between engine-drivers, guards, station-masters, or other railway officials. Fig. 7—The station-master can give notice of danger to the engine-driver and guard to stop a train in motion, by applying a sliding spring or tappet at a long distance from the station, without the necessity of leaving his duties at the station, causing the steam whistle, the revolving lamp, or semaphore on the engine, and the alarum bell or rattle on the guard's carriage to be put in motion.

Fig. 7.



A Spring or Tappet. B Handle of sliding spring. C Connecting Rod. F Spring at back. G Leading Pulley.

63. Patent Railway Brake; J. Sutherland, 37, Pickerington-street, Paddington, W. Exhibited by J. S. Morris, 3, Earl-street, City, E.C.

The object of the inventor is to lock all the wheels of the carriage or waggon simultaneously at pleasure. This is effected by placing drums on all the axle shafts of the carriage; round these drums are placed iron friction-bands coupled to a horizontal lever running along the frame of the carriage. This lever brings the bands into contact with the drums, thus acting as a brake. (See Drawing, No. 327.)—(See *Civil Engineer and Architects' Journal* for July, 1857.)

64. Patent Self-acting Railway Carriage Brake; Wm. Paxon, 23, Skinner-street, Snow-hill, E.C.

This brake is put in motion by the ordinary pressure on the buffer-rods, in stopping a train, and it allows a carriage, immediately on being stopped, to be pushed backwards without the necessity of awaiting the recoil of the buffer-springs. This is effected by means of a drum or wheel running loose upon the axle of the carriage-wheels, and carrying a spring catch, by which it engages, and is borne round with the carriage-wheels whilst proceeding in a forward direction, but from which they are released when turning in a backward direction.

65. Improved Railway Brake: Edward Finch, Bridge Works, Chepstow.

This invention consists in a means of altering the position of the lever in respect to the axis by which the breaks are actuated, so as to compensate for the wear of the blocks, and by this means always to maintain the lever in the same position in relation to the carriage or waggon. For this purpose the end of the break lever is arranged so as to move on the axis by which the breaks are actuated, and the break lever has attached to it a worm which takes into a worm wheel on the axis, so that as the blocks are worn away, by turning the worm attached to the break lever its position can be adjusted so as always to retain the same position in relation to the carriage or waggon.

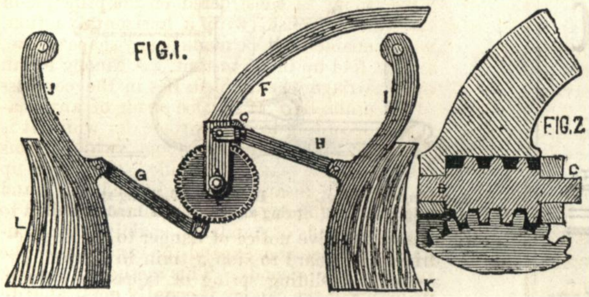
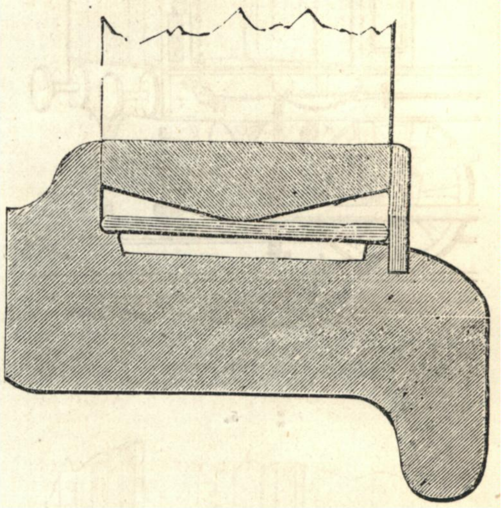


FIG.1.
FIG.2.

66. Improved Railway Wheel, entitled a Horse Foot Wheel; W. Bridges Adams.

This improvement has for its object; first, by placing an elastic substance between the tyre and the wheel, to reduce the non-elastic load to the tyre itself, which may be made much lighter, by reason of being saved from blows and by the absence of holes through it; secondly, by this arrangement a lighter wheel may be used, or one of cast iron, inasmuch as, the blow being prevented, there will be no tendency to break; thirdly, the wheel may be put together with the tyre cold by simple screw pressure, without needing skilled mechanics; fourthly, the tyres and wheels being all formed to exact gauges, a worn tyre can be taken off and replaced in any locality without needing workshops or machinery. The tyre is formed with an internal rib at the front, and the periphery of the wheel is turned so as to bear only at its mid-breadth. The internal portion of the tyre under and round the wheel is hollow, and a hoop of spring steel, three inches wide and 3-16 of an inch thick, is supported in two fillets on which the wheel rests. The spring for convenient manufacture is made in two halves, and they form a slight incline, so that the wheel enters easily at the back and, being forced up the incline by screw pressure, acquires sufficient tightness to become firm. A small groove, about 3-16 of an inch in depth, is turned in the back of the tyre parallel with the plane of the wheel, and in this is placed a false rib of iron or steel with a small piece cut out of it to allow the rib to be compressed and spring into the grove when the opening is keyed up and the wheel is secured in its place. The wheel is quiet and easy, without any ringing noise. If desired, the tyre may be put on with slight pressure, and the interstice filled with tallow, so that on curves the tyre may move round slightly to compensate for the inequality of the path-way, acting as a loose wheel. The cost of this wheel will not be greater than that of ordinary wheels, as the lightening of the tyre will compensate for the steel. The number of joints is diminished, the ordinary wheel having eighteen joints, and this wheel only six joints. Experimental wheels of this construction have been in use now eight months on the Eastern Counties Railway, first in a coke waggon, and then in a first-class carriage, and they are now being applied on the North London Railway. On the Eastern Counties they are also about to be applied to the coupled driving wheels of a locomotive engine, when they will serve the object of preventing the destruction of tyres and rails and also of equalising the alternate thrust and pull of the connecting rods.



67. Railway Wheel; W. Bridges Adams.

This model shows wood applied in a continuous hoop between the wheel and tyre.

68. Improved Railway Wheel; James Murphy.

69. Patent Locomotive Engine; George Inman, Susannah-street, Poplar, E.

The object of this invention is to economise motive power when applied to locomotion. This it is proposed to effect by causing high-pressure steam or other motive power to expand a series of hollow discs or steam chambers arranged round the axle, and carried by each of the wheels of the locomotive. These discs or chambers are connected by radial pipes to the boss of their respective wheels, and have attached to their outer or moveable ends radial rods, which pass through slots in the periphery of the wheels, and carry feet, which bear upon the ground in succession, for the purpose of driving the engine forward. The steam is generated in a boiler mounted on the frame of the engine, and it is conducted through the hollow axle of the driving wheels to the boss of the wheels, whence it passes through the radial steam pipes to the several hollow discs or steam chambers. Between the boss of each driving wheel and the axle is an annular valve, which admits and discharges the steam at the proper time to and from the several steam chambers in succession, and by an arrangement of shifting gear, the position of this valve may be changed at pleasure, so as to reverse the motion. The steam chambers of the discs may be usually made of india-rubber, joined together at their outer edges by a ring of metal, which will prevent them from expanding in the direction of their diameter; but when great power is required to be exerted, the expanding and contracting chambers may be made of metal.

70. Apparatus for expediting Town Postal Communication; O. H. Hodges, 5, Crown-street, Finsbury-square, E.C.

It is proposed that this apparatus should consist of a subterranean tube, with small boxes or carriages travelling within it, for receiving letters dropped into pillar letter-boxes. The letters are thus to be constantly transmitted to the central stations for delivery. (*See Builder*, July 4, 1857.)

71. Patent Omnibus and Carriage Break; Robert Ker Aitchison, New North-street, W.C. Exhibited by Davies and Hunt.

This break is self-acting. When the horses stop the backward thrust of the pole acts upon two levers, which apply the breaks. The same effect is produced by the carriage overrunning the horses in descending a hill. When the horses begin to draw, a spring releases the breaks. There is a treadle by which the driver can lock the pole, and thus prevent the break from acting when backing, or when otherwise desirable.

72. Cab Omnibus; V. De Tivoli, 18, Stanley-place, Pimlico, S.W.

This omnibus is placed on DeCristoforis's conical wheels, and has an arrangement by which a brake is applied on the backing of the horses.

73. Patent Indicator for Omnibuses, &c., Francis Parker, Elm-house, Homerton, N.E.

This apparatus consists of a tube with a box at the top filled with balls. There is an arrangement by which one ball at a time is allowed to fall into a lower compartment, and strike a bell, thus indicating the number of passengers. (See Drawing, No. 363.)

74. Carriage-door Shields; Charles Norton, 34, Hawley-road, Camden Town, N.W.

These are designed to prevent accidents arising from the shutting of railway or other carriage doors. They consist of metal plates, folding over each other, on the hinge side, so as to prevent the possibility of the fingers being crushed.

75. Patent Tubular Carriage Shafts; John Clarke, High-street, Shiffnal.

These shafts are made of a taper tube of malleable iron, and are said to be stronger, cheaper, and more durable than ordinary wooden shafts.

76. Patent Horizontal Fin-expanding Canopy, for Carriages, Boats, &c.; T. L. Scowen, Allen-road, Stoke Newington, N.

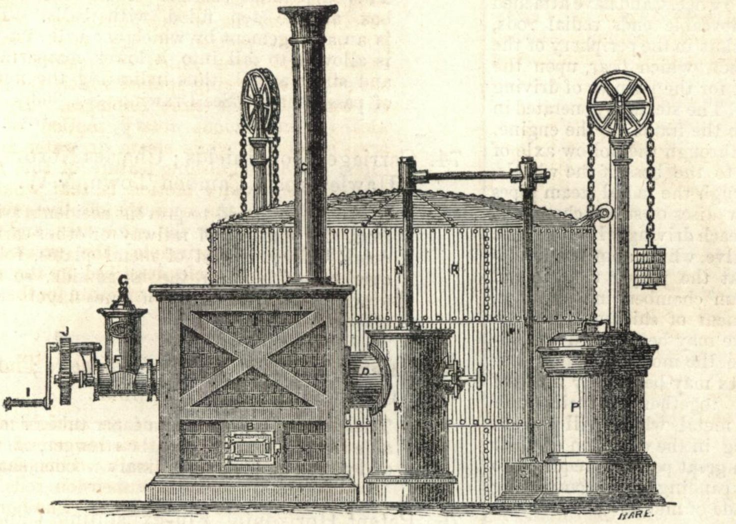
This canopy is constructed on the principle of the fin of a fish, with a horizontal action, which enables it to be made to any shape or size, and to fold up in an instant. A canopy for an open carriage when folded, lies in the compass of an umbrella. It can be made of any material, according to the purpose for which it is designed. The omnibus canopy, which forms a back to the seat when folded, is worked up or down by means of a right and left hand screw, working two nuts, which are attached to the lower ends of standards, enabling the conductor to raise and expand the canopy over the roof in a few seconds. This method of raising or lowering the canopy is equally applicable to boats and many other purposes. (See Drawing, No. 364.)

MACHINERY AND MANUFACTURING APPLIANCES.

(For the remainder of the Articles in this Section, see Drawings.)

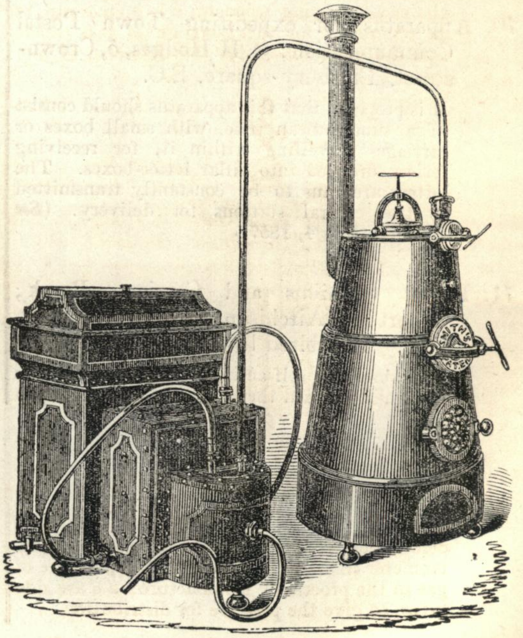
80. National Coal Gas Apparatus; J. T. B. Porter, Lincoln.

This apparatus is suitable for the manufacture of gas either on a large or small scale; but it is peculiarly adapted for supplying private houses, workshops, railway stations, lighthouses, and ships, and consists of a retort placed inside a case lined with fire brick, such retort being furnished with an Archimedean screw for the facility of supplying it with fresh material, the screw at the same time discharging the coke or other carbonised substances which have been exhausted of their gas. Each charge of the retort is led at one end through a vertical pipe, having a flange fixed on its upper end, into which a plug is fitted; this pipe opens into a chamber, in which the screw works, and as fast as the material is exhausted of its gas it is pushed out by the screw at the opposite end and replaced by fresh material, which is traversed through the retort by occasionally turning the screw; this may be done by a winch handle, fly wheel, or gear work fitted for that purpose. The coke or other substances from which the gas has been exhausted fall through a descending discharge pipe into an iron vessel, or a reservoir of water, if required, and may be removed in any convenient manner. The gas passes up through a pipe to the condensing and purifying apparatus. (See Drawing, No. 346.)



81. Patent Gas Apparatus; Sharman and Smith, Wellingborough, Northamptonshire.

This invention consists in using an upright conical retort, with suitable flues, by which means a greater quantity of gas, in proportion to the amount of coal consumed, is produced; and by the manner in which the retort is surrounded with flues, a larger amount of its surface is presented to the action of the fire. In the arrangement for purifying the gas, the supply of water through which the gas passes is regulated by means of stop-cocks; the purifyer and the gas are made to take a long and tortuous course through the water, and over and under a sufficient number of beds of lime before passing to the gasometer. The model shows a complete apparatus for making gas to supply three or four lights, with the exception of the tank and holder.

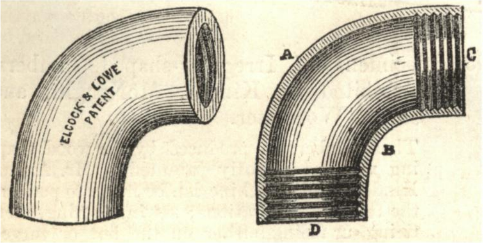


82. Patent Dry Gas Meters; James Meacock, 7, Snow-hill, and Giltspur-street, E.C.

In this meter the leather diaphragm is held between two flat metal rings and screwed up to a frame, instead of being fastened with the soldering iron, which is apt to injure the leather. The valve adopted in this meter does not rise from its facing.

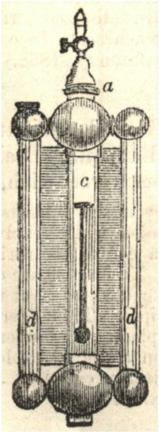
83. Patent Wrought-Iron Round Elbow; Elcock and Lowe, Holyhead-road Tube Works, Wednesbury, Staffordshire.

These wrought-iron round elbows may be made from 1-16 to 2½ inches internal diameter, and, being rounded on both the inner and outer sides, ensure a steady transmission of the gas, steam, water, &c., passing through them, and, as the peg or tool upon which the welding is performed is so formed as to circle round the angle B, the inner section is finished and made smooth, and a perfect soundness of weld is ensured.



84. Patent Gas and Air Test Guage; W. Reichenbach, 33 and 34, Borough-road, Southwark, S.E.

This is an instrument for detecting any impurity that may arise in the process of manufacture of gas; also for testing the quality of deleterious air in mines or confined spaces. In the accompanying woodcut, *a* is a cross cap, to be unscrewed for the insertion of test papers into the glass tube *c*, for the detection of any deleterious product; the tube *c* has also a thermometer (marked *b*) to show the temperature of gas in the process of manufacture; *d d* are side tubes, to give the pressure for distribution.



85. Patent Annular Recoil Engine; T. Ivory, Ainslie-place, Edinburgh.

This engine has two arms, which are open at their outer extremity except in so far as they are closed by an outer ring, and they are arranged so as to be capable of being made to revolve freely within the ring round the centre, at which steam or water is supplied for moving them. There is an orifice at the extremity, for the escape of the steam or water. The area of this orifice may be one-fourth of that of the arm or tube on the cross section. There is a fixed ring supported on a frame work, and the extremities of the arms are all but in contact with the interior of the ring, so that the only outlet of the steam or water from the arms into the atmosphere is through the side orifice at the end of each. On steam or water being admitted into the arms at the centre, and allowed to escape at the orifices, the arms will be made to revolve by means of the unbalanced pressure left on that portion of the short limb of each of the arms which is opposite to the arc of the outer ring against which the steam or water for the time impinges. By this means a continuous rotary motion of the arms is kept up while steam or water is supplied. A distinguishing feature of this mode of producing rotary motion is, that whatever be the length of the arms, the effective pressure is always applied on the same area, and thus, by the steelyard principle, the greater the diameter of the circle described by the arms, the less is the expenditure of steam for the same work done.

86. Double Acting Horse Wheel; Thomas Mann, Boro'bridge.

This invention consists of an upright shaft, fitted with a platform at its lower end, upon which the horse or horses walk. This platform is supported by suitable suspension rods connected with a boss on the shaft. The horse or horses are yoked to a bar, which is fixed to a collar or socket revolving loosely round the upper portion of the shaft, so that, as the horses attempt to walk, the motion of their feet will cause the platform to rotate in one direction, whilst their shoulders will push the bar or power lever round in a contrary direction. In order to combine these two opposite movements, a spur wheel is keyed on to the upper end of the shaft, and a set of internal toothed segments are fixed to a set of arms radiating from the loose collar or boss, and revolving with the power lever. Between this internal and external gear is a pinion which gears into both wheels simultaneously, and as they both revolve in opposite directions, they will impart one uniform motion to the pinion, which, through its shaft, transmits the movement to any required machinery.

87. Dynamometer; John Alcock, 3, High-street, Bolton.

This instrument is intended to measure and indicate the power required to drive any particular machine. It consists of a spring balance attached to a band fastened to the periphery of a wheel, attached to one side of which is a frame carrying toothed wheels at one extremity and a balance weight at the other; this is so arranged as to act upon the spring balance, and indicate the strain put upon it.

88. Eighteen-inch Planing Machine; Batho and Bauer, Salford, Manchester.

The novelty of this machine consists in the manner in which the object operated upon may be adjusted, and the arrangement of the link motion, to effect a quick return, as well as uniform motion, whilst cutting. To the underside of the table is attached a screw, the nut on which is connected with the link, so that in planing an object of a hollow square form, it is not necessary to travel over the centre opening.

89. Patent Double-Action Traversing Drilling Machine; Andrew Shanks, 12 John-street, Adelphi, W.C.

This machine is especially adapted for making cotter-holes, mortices, or key-ways in metal; also for grooving shafts, axles, &c. The article operated upon is placed in the centre of the machine by means of the concentric vice and poppet headstud, the two drills being driven by top driving, like an ordinary lathe, the diameter of the drill determining the width, and the variable crank at the end of the machine operating on the carriage determining the length of the mortice or groove required.

90. Patent Horse-shoe Machine; Henry Burden, Troy, New York. Exhibited by Davies and Hunt.

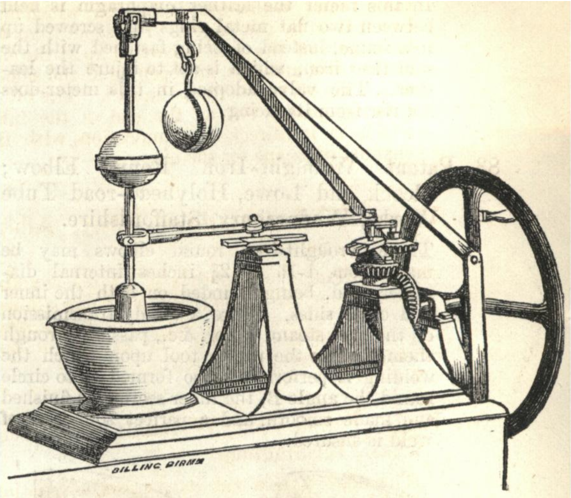
In this machine, the red hot bar is placed in the trough, and is drawn in by the feeding rollers, cut to the proper length, and bent to the required form. The toe is then pressed between two cams, to make it thinner and broader, and bevil the inside; a flange preventing the shoe from spreading. Another cam then punches the grooves and nail-holes, after which the shoe is straightened, and falls out of the machine complete. The machine is capable of making sixty shoes per minute. There is an arrangement for stopping the machine when there is not a sufficient length of bar to form the complete shoe.

91. Double Platform Weighing Machine; Julius Schonemann. Exhibited by R. and L. R. Bodmer, 2 Thavies-inn, Holborn, E.C.

This is suited for small parcels, but the principle is applicable to weighing machines in general.

92. Patent Grinding and Levigating Apparatus; H. Goodall, Derby.

This invention consists in an arrangement whereby the operations of grinding or levigating various substances may be performed by the aid of a pestle instead of rollers or flat grinding surfaces. The materials to be operated upon are placed in the mortar, in which the pestle is made to work by mechanical means, in such a manner as to give the same rubbing motion as is given by hand. The pestle may be weighted to any desired extent, and as it traverses over a different surface every time, there is no necessity for scrapers.



93. Specimens of Irregular-shaped Timbers. Exhibited by Kinder, McNaught, and Smith, Worcester.

These timbers are produced by the wood shaping machine recently patented by Mr. Arthur Kinder. This machine can be made to perform the following operations; sawing, boring, morticing, sur facing, either on the flat or curved work, producing regular, irregular, or winding bevils, tenons, grooves, rebates, &c. It will also saw ships' timbers to the proper shape at one operation. The specimens exhibited are as follows:—No. 1 illustrates planing; No. 2 regular bevil; No. 3 winding bevil straight; No. 4 six specimens of tenon cutting; No. 5 curved work on the square; No. 6 curved work on the winding bevil; No. 7 curved work on the regular bevil; No. 8 curved work on the horizontal; No. 9 rebating, square and bevilled; No. 10 grooving with quirk on edge; No. 11 curved grooving; No. 12 boxing irregular surfaces; No. 13 beading; No. 14 double compassed work. Eleven pieces marked A are full-sized carriage timbers, joined wholly by machinery. (See *Practical Mechanics' Journal* for January, 1858.)

94. Improved Method of Cutting and Shaping Spokes; Benjamin Beale, 7, Lambton-terrace, East Greenwich, S.E.

The improvements consists in cutting or shaping the spokes while revolving round or oscillating on a centre eccentrical to the centre of the spoke. The tenons are cut, and the shaping of the spoke completed at the nave end on the same principle. This operation may be performed by placing a number of spokes at a proper angle on a sliding table, and passing them against suitable cutters. Spokes of various kinds are exhibited.

95. Patent Oil Can; John Jobson, Bulwark-street, Dover.

This invention has for its object the better regulation and insuring the supply of oil for lubricating bearings of machinery, &c. For this purpose a tube is placed over the spout of the oil can; in this tube is a piston, which may be acted on by the finger. The spout from the lower part of the can is carried up at the side of the tube, and has an opening at the side at which the oil enters from the can. The oil so entering passes out at the end of the tube, which is in direct communication with the channel of escape for the oil.

96. Patent Lubricator; John Bailey, Albion Works, Salford.

This arrangement consists of an oil chamber placed over the bearing, the oil being allowed to flow between a needle point and a small opening in the bearing, the amount of flow being regulated by a screw.

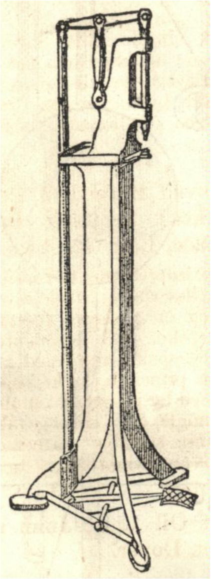
97. Hyde's Patent Vice; W. Adkins, Shadwell-wharf, Birmingham.

The sides of this vice have a parallel motion, which is given by a sliding bar, acted upon by a screw.

98. Improved Bolt and Nut; James Murphy. Exhibited by John Gedge,

This invention has for its object the fixing of nuts on bolts, or bolts in plates, in so secure a manner as to assure the nut or bolt from all movement after it shall be keyed. Each bolt is to be grooved or indented across the threads of the screw, and the nut or plate grooved or indented in like manner, and these grooves are tapped to receive a screw or plain pin.

99. Patent Foot Lever Press; R. Houchin, 7, Bridport-pl. New North-rd. Hoxton, N.



This machine is used for fixing and closing eyelets. It enables the workman to have both hands at liberty to hold and adjust the work, while pressure is obtained by the foot.

100. Improved Silk Throwing Machine; B. A. Murray, 2, Trinity-place, Trafalgar-square, W.C.

This machine produces weft in one operation, and warp or organzine in two operations from the cocoon or skein. If from the cocoon, the silk may be reeled or partly spun as experience may direct; in either case the three operations of spinning, doubling, and throwing are effected at once, and may be done with the ordinary speed of the throwing mill; the weft more speedily than in the usual way, as the machine has the novel feature that the reel taking up imparts a twist as well as the reels or bobbins giving off.

101. Patent Balanced Presser; W. Sumner, Bold-street, Preston.

The object of this presser is to equalise the strain on the thread during the time that it is being wound on the bobbin.—(See *Practical Mechanics' Journal* for July, 1857.)

102. Patent Metal and India-rubber Picker; H. Heald, Sabden Whalley, near Blackburn.

Pickers are used in weaving for the purpose of throwing the shuttle to and fro across the warp. Hitherto pickers have been made of leather, buffalo hide, or wood, but this invention consists in making the whole frame of the picker of metal, with a cushion or packing of india-rubber where it strikes the shuttle. The india-rubber is kept in its place by means of a collar or narrowing in the packing chamber, and the packing is effected by stretching the india-rubber and passing it through the collar, and then allowing it to collapse. It is stated that pickers of this description will last twice the ordinary time, and when the india-rubber is worn out it may be renewed at a small cost. By the use of this picker, the damage to the cloth, so frequently caused by pieces of the old picker flying into it, is prevented. (See *Mechanics' Magazine* for August, 1857, No. 1775, Vol. 67.) The specimens exhibited are—1. Plain calico loom picker; 2. Drop-box loom picker for weaving stripes and checks; 3. Plain calico loom picker, not packed; 4. Plain broadcloth loom picker; 5. Drop-box do. do.

103. Patent Electro-plated Printing Rollers; J. D. Mucklow, Blackford Bridge, near Bury, Lancashire.

Four models are exhibited:—1, Represents a plain iron roller or cylinder (on mandril), ready for engraving; 2, An engraved iron roller, previous to its being electro-plated; 3, A roller electro-plated with copper; 4, Electro-plated with nickel.

104. Patent Rope Machine; Archibald Smith, Princes-street, Leicester-square, W.C.

The peculiarity of this machine consists in the arrangement of the reels containing the wires

Fig. 1.

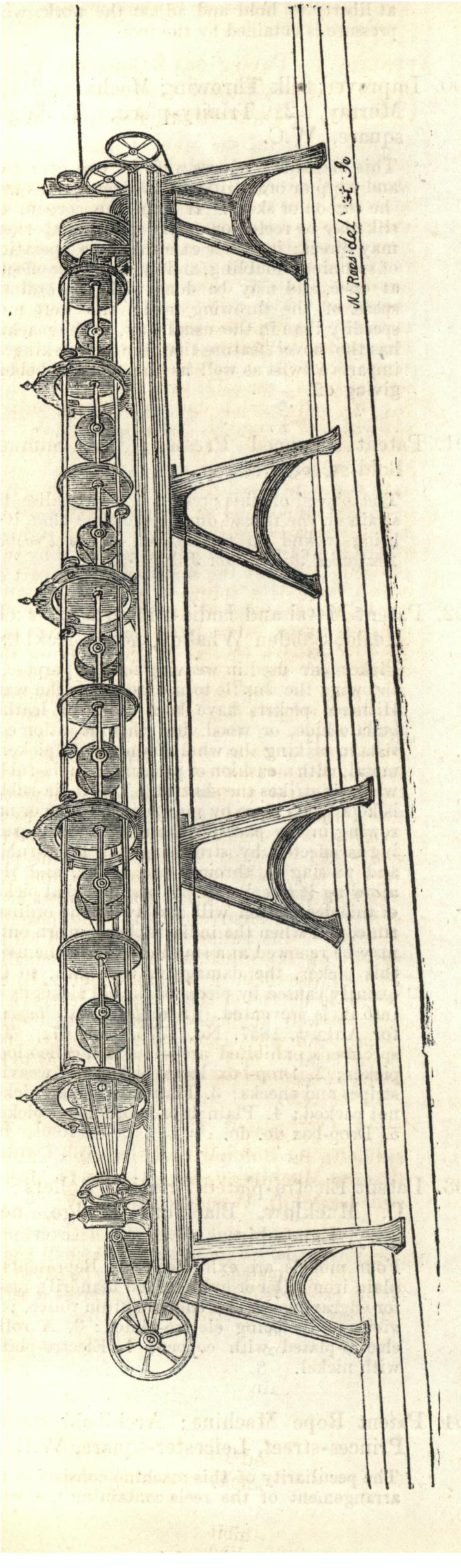


Fig. 2.

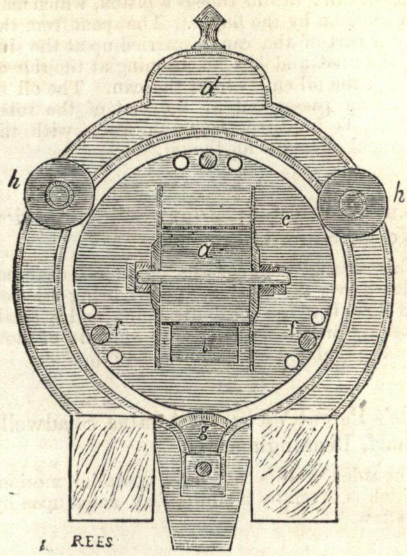
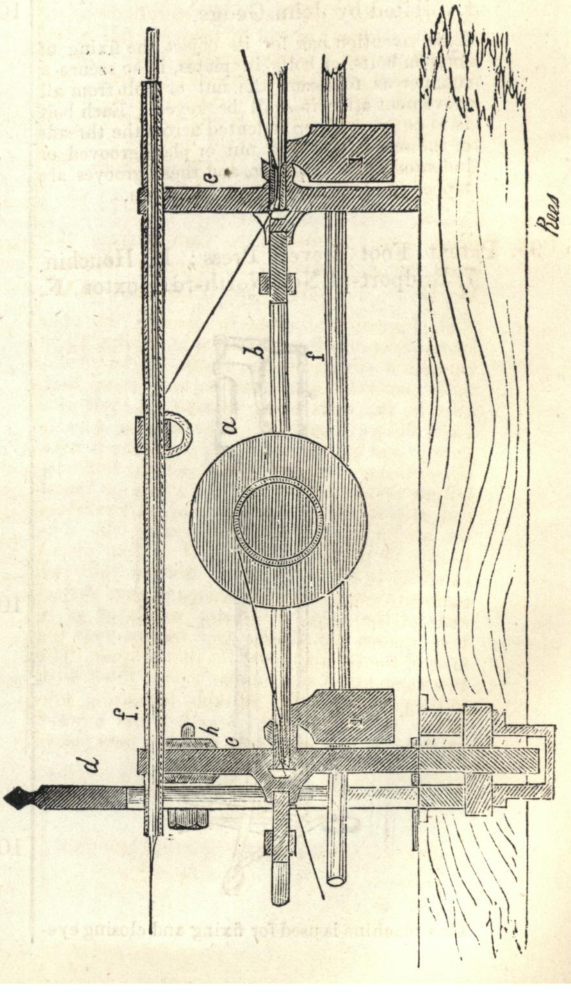


Fig. 3.



or strands, which are required to be laid together so as to form strands or ropes in the centre of a revolving frame of small diameter, in such a manner that all motion to the reels and their contents and frames, as well as all twist or torsion to the individual wires or strands is avoided. The engraving marked Fig. 1 shows a perspective view of the complete machine. Fig. 2 a cross-section. Fig. 3 longitudinal section of one compartment. A, reel containing wire or strand; B, frame for carrying the reel, mounted in bearings, in centre of disc C, and having a weight, I, attached to underside, to prevent it being carried round; C, disc with three tubular distance pieces between each pair, and bolted together by long bolts; G, roller supporting disc C; H, H, ditto, or frames D, steadying same. The machine is composed of a series of discs framed together, having between each a reel frame, as shown, and at its one end a laying plate attached thereto. This frame is driven by means of a strap, and is geared to the necessary draw-off apparatus. The wires or strands pass from reels A, through noses of frames C, and emerge by angular holes on the front sides of disc C, over small pulleys on the tubular distance pieces F, along through holes in each disc, till they reach the foremost one, thence through a laying plate to a nipper or tube. Motion being given to the frame (the bobbins, by means of the weight I, being prevented from turning), the wires or strands are laid together, and drawn off simultaneously. These machines are said to have the following advantages, viz.: a much greater speed without danger to the workmen, economy of power, less wear and tear, while the workman is enabled to see the state of the reels during the working of the machine, and thus avoid many defects in the manufacture. (See Drawings, Nos. 340 and 341.)

105. Patent Improvement in Connecting the ends of Submarine Telegraph Cables; W. B. De Blaquiere, 50, Pall-mall, S.W.

This invention consists in opening the ends of the outside wires of the cable, passing them through a circular metal wedge (or longitudinally perforated cone) and turning them back over it, the ends being secured on their own parts by wire seizings. The electric wire is then joined in the usual way, covering it with the ordinary coating of gutta percha, sufficient length being allowed to take a half or round coil with it (this is very essential, as it provides for stretching without endangering the continuity of the electric wire); it is then placed carefully in a tubular cover, divided into two segments lengthwise, the wedge or cone-shaped ends of the outer wire being so placed as to bear against the inside cone formed near the ends of the tubular cover for that purpose. The two segments of the tubular cover, filled with gutta percha or other suitable insulating substance, are then brought together and screwed up tight by means of nuts and key nuts placed at the ends, so as firmly to grip the cable and protect the part where the joint has been made. Different sized cables can be thus connected.

106. Apparatus for Paying-out Submarine Telegraph Cables; Lionel Gisborne and H. C. Forde, 6, Duke-street, Adelphi, W.C.

In this apparatus the cable is passed over a pulley, which is carried by an arm (E), (as shown in the drawing, No. 433,) suspended from a universal joint immediately over the centre of the coil, and it has also another universal joint near the pulley (D); thus the arm can oscillate in all directions, and the pulley can follow the succeeding coils in which the cable is laid in the vessel. The cable next passes under a stationary pulley (F), and then over a drum (G) (which is governed by a break), worked with levers ($L^1 L^3$), around which it takes several turns; the cable then passes over a pulley (H), and descends under a moveable pulley (I) which is weighted, and has a quantity of chain attached to it, and when the strain comes on the cable it draws it more and more nearly into a straight line, lifting at the same time the weighted pulley, and so becoming subjected to a continually increasing weight. The weighted pulley in its rising and falling is guided by two uprights (O O), at the upper and lower part of which there is a spring or buffing apparatus (P P), to counteract any sudden rising of the pulleys. The cable lastly passes over two guiding pulleys (M N) to the stern of the vessel. On the upper coils of the cable in the hold of the ship are placed numerous spherical weights (C), which cover the whole upper surface of the coils, and they at all times keep a slight strain on the cable, and prevent it, as it runs out, from drawing up portions of the coil with it. The weighted moveable pulley (I), mentioned above, will be so weighted with chains that when it is pulled up to the top, or nearly horizontal with the pulleys (H M), it will register the maximum safe strain on the cable; and to guard against accidents from excessive strain, the apparatus attached to the pulley (I) is furnished with a cup or box (K), which, as it ascends gradually, picks up the chain or hanging weights (L) attached to the end of the compound levers (L^1), and thus, by gradually relieving the breaks, allows the drums (G) to work more freely. The uprights (O O) may be so graduated as to register at all times the strain on the cable.

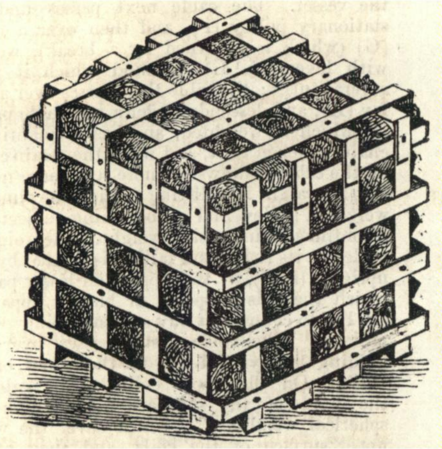
107. Patent Corrugated Grooved Wheel, for submerging Submarine Telegraph Cables, driving Machinery, &c.; C. and G. Johnson, East-hill, Wandsworth, S.W.

The periphery of this wheel has a deep channel, the sides of which are inclined at a small angle, and are corrugated. The rope to be payed out being passed round this wheel, receives a series of grips from the corrugations.

NAVAL AND MILITARY APPLIANCES.

(*For the remainder of the Articles in this Section see Drawings.*)

110. Patent Caisson de Fer, for obtaining Foundations for Marine and other Structures; E. Manico, Lieut. R.M., 4 Barge-yard, Bucklersbury, E.C.

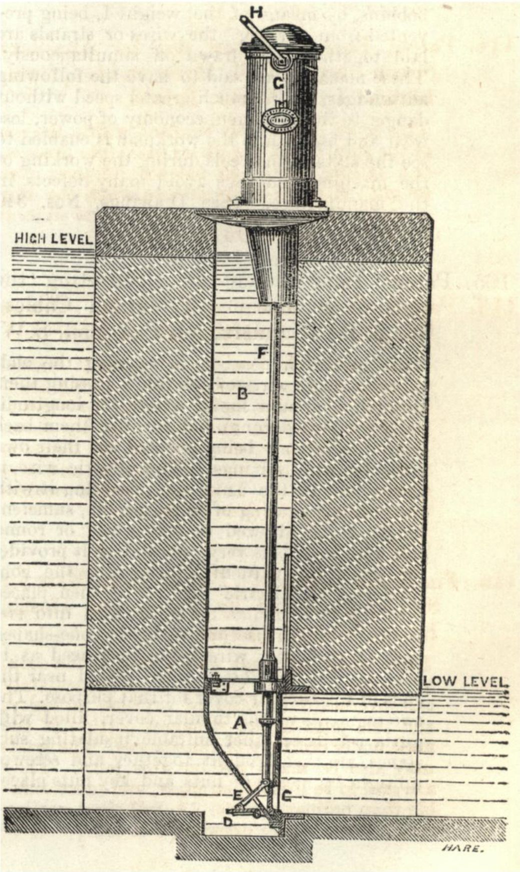


The model exhibited is on the scale of two inches to the foot. The caisson de fer is three feet square, made of three-inch by half-inch flat bar iron, put together with three-quarter-inch screw bolts and nuts, and, when filled with rough stones, and the interstices with sand, weighs upwards of two tons. These caissons de fer, possessing the power of arresting the violence of the sea, can be advantageously used on any exposed coast, for the construction of floating docks or canals, reclaiming land washed down by the sea, &c.

111. Chambered Graving Dock; Richard R. Grantham, 7, Great Scotland Yard, S.W.

This model is to the scale of one-tenth of an inch to the foot. The dock is 500 feet in length, 60 feet at the entrance gates, and 30 feet deep. It is proposed to divide it by two or more caissons, which are to be placed in the grooves. The entrance gates are those of ordinary construction. The object of this invention is to accommodate two or three vessels at the same time, according to their lengths, so that the repairs of one or more can be proceeded with while the others can be taken out of and put into dock without impeding the work or keeping one vessel waiting in dock till the other is completed. The dock may be worked by fixing the caissons in the grooves, so that when one vessel is placed in the upper chamber the water is then drawn out by sluices or other means, and the same may be done with the other chambers, and when the repairs of the vessel in the lower chamber have been completed it can be taken out and another vessel let in, while the repairs of that in the middle chamber are proceeding, and so on with the middle with respect to the upper chamber, and the water can be let in and the caissons removed to take the vessels out and to admit others. A dock of this description would almost answer the purposes of three distinct graving docks, and at the same time accommodate one of the largest class vessels. Docks divided in this manner may be extended to 1,000 feet in length, and could be made with an entrance at both ends where the locality is favourable.

112. Patent Sluice for Canal Locks; Lawrence Brothers, City Iron-works, Pitfield-street, N.



In this invention the pressure of the water against the sluice is made to assist in raising it. In the above wood cut, A is the paddle or sluice, the upper part fitting the chamber B;

C, small valve or sluice; D, small flap-valve connected with the valve C, by the link E, so that when C is raised D is closed; F, rod to machinery G; on turning the winch-handle H, the rod F is raised, opening the valve C and closing D, allowing the water from the chamber B to run off to the lower level through the opening C. The high-level water then presses in an upward direction against the sluice A, (the water in the chamber having been run off as described) and forces it upwards, the rising being regulated by the machinery G. In locks, the water is generally at the same level on either side when the sluice is required to be lowered, in which case it descends by its own weight; but, should it be required to lower the sluice against a pressure—that is, when the water is running from one level to the other—the rod F in descending closes the valve C and opens D, allowing the water in the upper level to fill the chamber B, producing an equilibrium of pressures, and the sluice is then lowered by the machinery.

113. Perforated Paddle Wheel Float; H. D. Deane, 18, Pigott street, East India Docks, E. (See drawing, No. 333.)

114. Patent Enclosed Screw, &c., for Auxiliary Steam Ships; J. M. Hyde and Co., Cumberland Iron Works, Bristol.

This screw is perfectly enclosed within the run of the ship, by sliding plates fitted into grooves, and falling like flood hatches by their own weight; it offers no resistance when the ship is under canvass, and by raising these slides it can be at once brought into use.

115. Patent Iron Masts and Yards; James Hodgson, 16, Sweeting-street, Liverpool.

In this invention the ribs are outside instead of inside, and may be made by rivetting angle iron to the plates, or by bending the edges of the plates outwards, and then rivetting them. These ribs being outside, increase the diameter of the base of the mast or column, and give greater strength. This arrangement enables the rivetting to be done by steam.

116. Finch and Lamport's Patent Iron Mast for Ships; exhibited by Finch and Heath, Bridge Works, Chepstow.

These masts are made with a joint at the deck, by means of which they may be immediately cast overboard in cases of extreme necessity, and this joint is the strongest portion of the mast under ordinary circumstances. The masts may also be made without this joint. They are said to be lighter, stronger, and more durable than ordinary masts. A full-sized section is exhibited. (See drawing, No. 332.]

117. Iron Yards for Ships, with mode of reefing and furling the sails without going aloft; Samuel Dyer, Bristol.

118. Improved mode of Reefing and Reducing Top Sails; W. A. Gilbee, 4, South-street, Finsbury, E.C.

This invention consists, first, in running lines from the reef between the head of the topsail and the fore part of the yard, and direct up to the head of the topmast; secondly, in arranging the reef tackle beneath the yard to run from the end of the yard to the quarter deck; thirdly, in the peculiar mode of strengthening the sails by bands and double ropes.

119. Improved Marline-Spike; J. Simon Holland, Woolwich, S.E.

The section of this marline-spike is oval, that of the old one being round. The improved one is a lever, as well as a wedge, for, on turning it on its axis, every time it comes flatways, between the strands of a rope, it may be pushed further in, and then, on further turning it the strands are separated by leverage.

120. Double-bodied Windlass; Samuel Dyer.

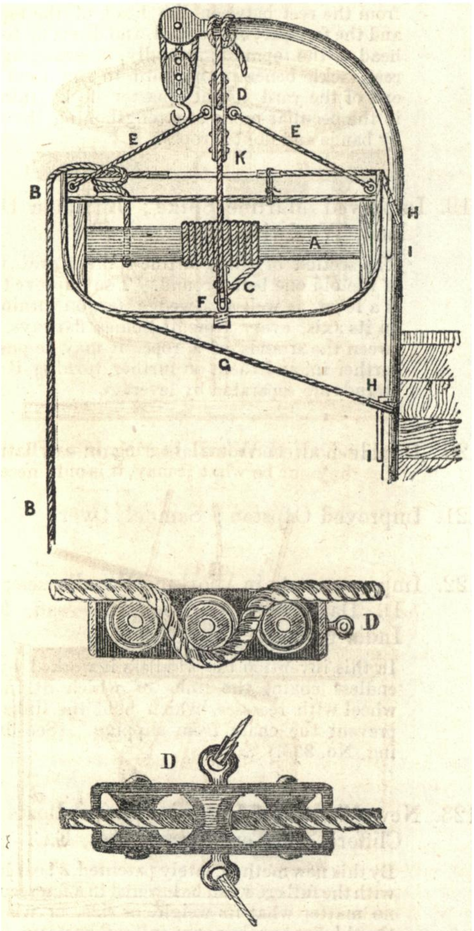
121. Improved Capstan; Samuel Dyer.

122. Improvements in Working Windlasses; G. D. Davis, 40, St. Leonard's-road, East India-road, E.

In this invention the windlass is worked by an endless chain, the links of which fit into a wheel with recesses, which hold the links and prevent the chain from slipping. (See drawing, No. 335.)

123. New Method of Lowering Ships' Boats; C. Clifford, 49, Fenchurch-street, E.C.

By this new method, lately patented, a boat laden with the full crew can be lowered in a few seconds, no matter what its weight or size, or whether the ship is at anchor or at full sail or steam. The lowering is done by one only of the crew from the boat, who, by paying off a single rope, at one time unlashes, lowers, and disengages the boat. The accompanying Fig. shows a cross view of a boat and the gear used for lowering. A is a roller which works freely in bearings at each side of the boat under one of the seats. B is the lowering rope, which is slackened off when lowering, one end of it being made fast to the roller and then wound on it a length equal to the distance the boat will have to descend from the davits to the water. C C are two other single ropes or pendants, which are made fast to the davits and pass through the 3-sheave blocks D D and the leading blocks F F; the ends of each then enter the same hole in the roller, but in opposite directions. By hauling on the lowering rope B the roller is turned round, and the pendants are wound on it a length equal to the distance the boat will have to descend to the water, and the end of the lowering rope is then made fast over a cleet on the boat's seat. D D are the 3-sheave blocks through which the pendants C C pass. They are firmly secured to the boat by a strap attached to the block F, and act like a "turn and a half" in the boat on each pendant, breaking the strain to the man lowering, and giving him control over the descent of the boat, whatever its weight may be. The "nip" or "turn and a half" in the block on the pendant, as it passes through it, causes the block to be dragged upwards as the boat runs down, and by making the block, to which the steadying lines E E are attached, become the point of suspense at which the boat hangs, and which is above the gunwale, thus effectually prevents its canting. The nip of the block only exists so long as there is any strain on the rope passing through it, and ceases by letting go the lowering line on the boat reaching the water. G is the ordinary gripe or lashing as altered, and made self-releasing. The gripe G is made in two parts, with thimbles at each end, the two parts being held together by a lanyard. When the boat is hanging on the pendants the gripes are passed round the boat, and the thimbles H H up the prong I I, the lanyard K is then hauled tight, and thus the boat is lashed to the ship's side. When the boat is lowered, the thimbles slip down the prongs and the boat is unlashed. The boat is raised by the ordinary tackles, which are unhooked when the lower ring gear has been rove, and the boat then hangs on the pendants. To lower, slacken off the lowering rope B, when the roller revolves and unwinds the lowering pendants, and the beat descends at any speed regulated by the man attending the lowering rope, and at whatever point of contact the boat touches the water, letting go the lowering rope releases it. as the ends of the pendants not being fastened to the roller, but merely put into a hole in it, unreeve themselves.



124. Single Pillar Revolving Davit; C. Clifford.

This davit is for stowing and lashing boats securely on deck, and getting them quickly outboard. It has a single stem or pillar, from which two arms branch out at an obtuse angle to each other, and from the extremities of which perpendicular bearings support the boat at any desired distance from its ends. The boat, securely stowed and lashed inboard over the deck, is, by one half turn only of the davit, thrown outboard over the ship's side, unlashed, ready for lowering.

125. Patent Wrought or Cast Iron Hollow-studded Cable Chain; W. & M. Bayliss and Co., Wolverhampton.

The chief advantages of this chain consist in the yielding property of the hollow centre stud, it being found that the solid stud, when an excessive strain is put upon the chain, acts as a lever, and occasions a breakage of the link.

126. Patent Safety Apparatus for Preventing Boats from Capsizing; M. Grouse and Co., 549, Oxford-street, W.

This consists of an arrangement of a pair of tie-rods and a rope, which suspend a weight at a considerable depth below the keel of the boat. The tie-rods being hinged to the sides of the boat, allow the weight to be raised as the boat approaches the shore.

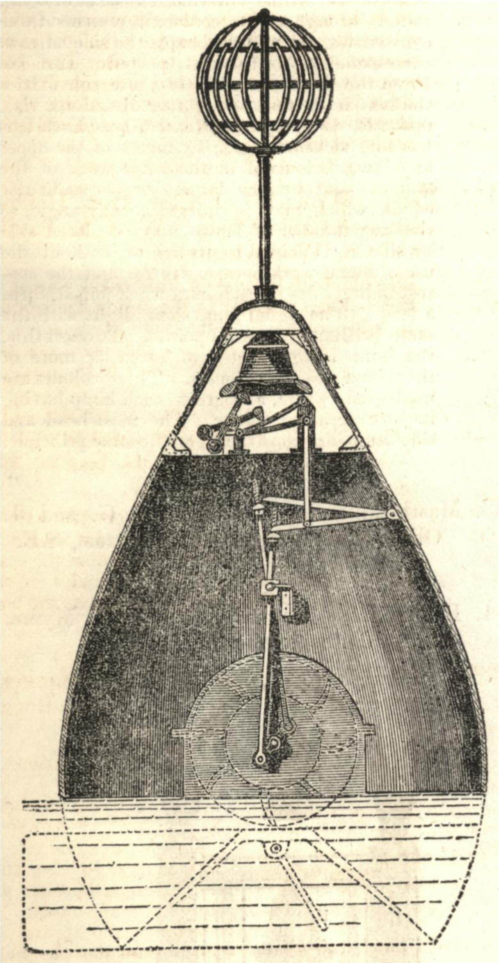
127. Patent Signal Apparatus, for communicating from the Deck to the Engine Room; George Hornsey, Southampton.

This apparatus, which is placed in a convenient part of the Engine Room, consists of a Dial which has marked on its face the various words of Command, such as "STOP," "AHEAD," "BACK," &c. This dial is mounted on a shaft, which may be rotated so as to bring any particular word or signal thereon, opposite an opening in the face plate of the apparatus. A bell is placed in the interior of the apparatus, which is sounded at each movement of the dial. Motion is communicated to the apparatus by means of suitable gearing connected with an iron column placed on the bridge or paddle-box. On the top of this column is an index, corresponding to the dial plate in the apparatus

128. Bell Buoy; G. W. Lenox (Brown, Lenox and Co.), 8, Billiter-square, City, E.C.

This invention consists in applying an undershot water-wheel, in the centre of an iron or other buoy, through which a pipe or watercourse is made, the lower or downward paddles of the wheel being driven round by the water passing through the trough. At each end of the spindle of the water-wheel is a crank, which works an apparatus arranged in such a manner

as to constantly ring a bell, which is fitted on the top of the buoy, so long as the current runs through the water-course. The alarm will thus be given to all vessels approaching dangerous reefs or shoals in tide-ways, in dense fogs, calms or dark weather, for upwards of 22 hours out of the 24. The same description of wheel can be fixed in a frame, and being thrown over the stern or side of a light vessel can be made to act in a similar manner.

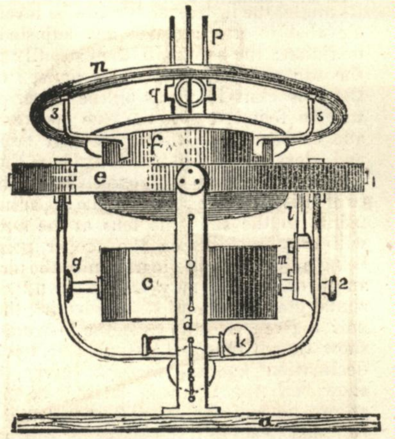


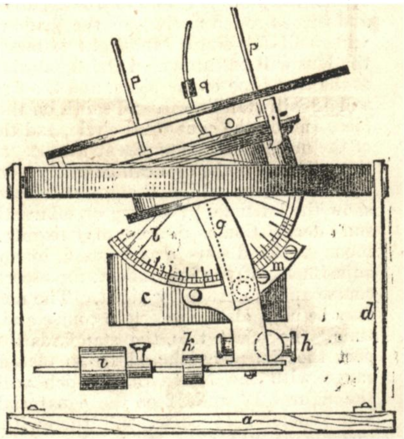
129. Engine Room Telegraph; Perreaux and Co., and T. Suffield.

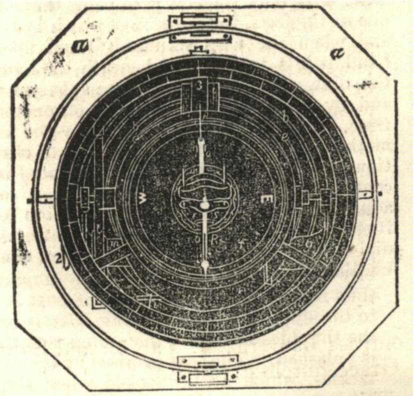
This is for the purpose of communicating directly between the captain or officer in charge and the engineer.

130. Patent Mariner's Time Compass; Ralph Reeder, 41, Southampton-buildings, W.C.

This instrument, which is a combination of a universal dial and chronometer, has been constructed to take any horizontal bearing in any latitude, at any hour of the day. It is also intended to solve those problems which can be solved by an armillary sphere, or by spherical trigonometry—so far as its circles and their motions extend; and it will be also found to supply the place of the magnetic needle. For **taking an horizontal bearing in any latitude, let the hour be what it may, it is only necessary in the first place to bring the hand, with its two upright wire standards at the ends, to the true apparent time; the instrument then being turned, till the hand points to the sun, gives the course. This hand is provided with a lens fixed in the centre, which takes the place of the gnomon of the universal dial, and is carried round by the chronometer once in 24 hours—**







the focus from which being thrown on the equatorial circle gives the true time. For finding the true apparent time of any place and taking its angle, the instrument should be levelled and elevated to true latitude, and adjusted to the meridian; the hand will then steadily point to the sun and follow it in its course; or when the lens casts its focus on the proper point, it will be found to give the true apparent time; and conversely, if the instrument be levelled and elevated to the true latitude of the place, and turned round horizontally until the hand (which is first fixed to the true apparent time) points to the sun; the lens at the same time will cast its focus on the proper point, and being adjusted to the meridian of the place, any angle or bearing may be laid down by a horizontal graduated motion. By having the declination given, and the time, the instrument will show the altitude and latitude; or, having the declination and the meridian given, it will show both the time and latitude of any place at any hour of the day. The instrument will be found to act as a substitute for the magnetic needle, by means of the shadow of the wire standards before mentioned. When the hand of the timepiece is placed to true apparent time, and turned round to the sun, the shadow of the wires will fall singly, and light refracted from the lens will be thrown on the equatorial circle at the true time of the place, and the figures 12 and 12 will stand north and south on the timepiece and on the equatorial circle, and the error of the needle will be apparent at once, and the time given by the dial can be easily converted into longitude; whilst the graduated arch will show the latitude, by adding or subtracting the sun's declination as the case may require. The moon or fixed stars may be used, by any easy adjustment of the instrument, for ascertaining course and longitude by night. The north star may be used also to ascertain course and longitude. To effect this, the standards that support the timepiece should be so placed as to range with the North Star, which will cause the figures 12 and 12 on the equatorial circle and timepiece to correspond therewith; the instrument will then be found to stand north and south. The instrument having been thus adjusted, to find the longitude by the North Star, it is only necessary to point the hand to one of the stars, the position of which is known, and when the wire standards fixed upon the hand points to the star, beneath the hand, on the dial, will be found its true apparent time, and by comparing it with the chronometer's time, longitude is easily found by the known methods. To facilitate the taking of observations by this instrument, the lens placed in the centre of the dial-plate is so arranged as to admit of easy elevation and depression to suit its being adjusted to the sun's declination. The dial and compass of the instrument are made to oscillate upon their axes.

131. Compass Lantern; J. Vardon and Sons, 3, Gracechurch-street, E.C.

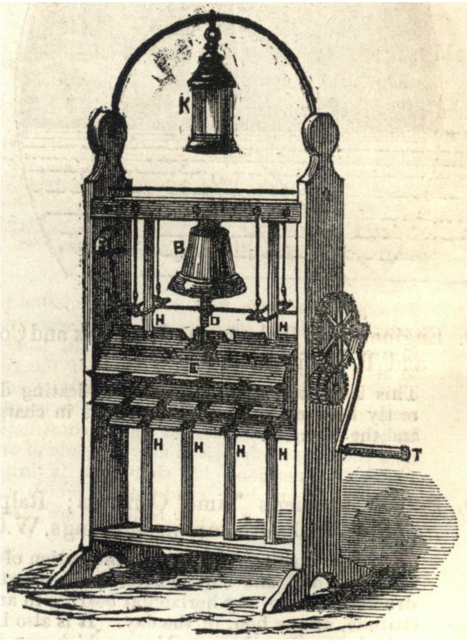
This instrument combines the ordinary compass with a hand-lantern.

132. Patent Ship, Signal, and Harbour Lamp; J. Weir, D. and G. G. Brown, 25, Wickham-terrace, New Cross, Deptford, S.E.

The lenses used in the construction of these lamps possess the property of diffusing light, instead of concentrating it, like the ordinary circular lenses. In the lamp with the circular lenses the light is not visible, unless the eye be kept directly in the focal point of the lens. The shape of each lens is square, presenting three flat surfaces posteriorly, the central broad, the side narrow, whilst anteriorly, instead of being round throughout its course, it presents three convexities, the middle broad, the side narrow, corresponding to the flat posterior surfaces. From the centre of each of these convexities the lens is flattened off in four directions, viz., upwards, downwards, and laterally. Each lens has four sides or edges; by means of the upper and lower it is fixed in the frame work of the lantern, and by the lateral or perpendicular edges, which may be mitred to any angle, so that any number of lenses may be placed side by side, it is joined to its fellow without the use of metal work beween tthem, and the corresponding sides of each lens, when joined, form a lens. The signal lamp shows light with the same brilliancy from all points. To effect this, the lamp is constructed of seven or more of the above-described lenses. Three colours are used—red, white, and green, each lamp having its own separate colour. The mast-head and side lamps are constructed on the same principle.

133. Masthead and Ships' Lamps; G. and J. Oliver, 286, Wapping High-street, S.E.

134. Patent Ships' Fog Signals; W. H. Myers, 202, Whitechapel-road, E.



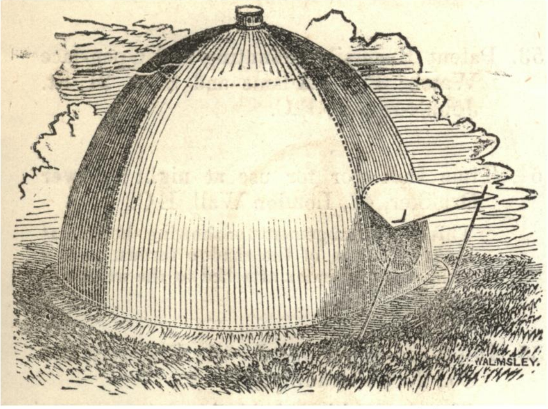
B Bell. **C. The Tappet.** **D The Hammer of Bell.**
E Revolving Toothed Cylinder.
F Pawl or Catch. **H Springs.** **T The Handle.** **K Lantern**

This apparatus is intended to be used on board sailing vessels during fogs at sea. When steering in one direction, by turning a handle a bell can be sounded, and when steering in the opposite direction, a very powerful rattle can be put in motion by turning the same handle, the bell ceasing to sound when the rattle is in action, and *vice versa.*

135. Self-acting Ice Indicator. Exhibited by N. M. Cummins, Annmount, Cork.

The object of this invention is to indicate to navigators the proximity of floating icebergs, when by reason of fog or darkness they are not visible. A small stream of water is allowed to flow into a vessel through a tube, in which a theometric rod is mounted. One end of this rod is fixed, while the other is free, it being intended by its contraction and expansion to work a lever connected with an alarum. The free end of the rod is jointed to the short arm of the lever, and thus the amount of its contraction beyond a certain limit is multiplied sufficiently to set the indicating apparatus in action. Whenever, therefore, the vessel approaches an iceberg, the inventor states that the decreasing temperature of the water in its neighbourhood (for a distance ranging about two miles) will cause the thermometer rod to contract and set the alarum in action.

136. Hospital and Field Tents; Capt. G. Rhodes, 94th Regt., Chatham.



The canvas of this field tent is supported by radial ribs, the upper ends of which are secured to a central head-piece, provided with sockets to receive them. The lower ends of the ribs enter loops in an endless circumscribing cord or ground rope, which is pinned to the ground by tent-pegs. The hospital tent is constructed on a similar principle, and may be made of any required dimensions. A ridge-pole is introduced between two head-pieces, which are carried by radial ribs, and bent ribs are passed upwards from the looped ground-rope to fit into sockets attached to the ridge-pole. (See Drawings, Nos. 338.)

137. Military Field Stabling; T. D. Rock, 8, Napier-street, Wellington-street, Islington, N.

The model exhibited represents, on a scale of one inch to a foot—1. A waggon six feet high, to which the stabling can be attached. 2. Three tubes of galvanised iron, fitting into rings and sockets, each two feet above the top rail of the waggon. 3. Three tubes with solid points fixed into the ground, parallel to the last-named, at a distance of seven feet and a-half from the waggon, and standing six feet and a-half high. 4. Two tubes of eight feet in length, connecting each of the three uprights. 5. Three tubes eight feet and a-half long, uniting the uprights, fixed in the waggon with those at a distance of seven feet and a-half in the ground. 6. A covering of light water-proof canvass, enveloping the whole frame-work, and pegged to the ground like an ordinary tent. 7. A small tin manger, hung from the rail of the waggon, to hold the corn. By this arrangement on both sides of the waggon, four horses can be readily accommodated. On the march, the tubing and canvass are to be strapped to the sides of the vehicle. The additional weight per horse is about 32lbs. The model shows the tent as erected for use, and as packed for transport.

138. Patent Mortar; Captain T. A. Blakely, R.A.

The peculiarity of this mortar consists in the whole being made in concentric layers, each slightly compressing that within it, so that when the strain comes, all may be strained nearly equally. In a cast mortar the interior must be strained much more than the exterior. It is stated that this arrangement gives greater strength at a cheaper rate, and affords facilities for making ordnance of a size hitherto found to be impossible.

139. Improvement in Fire-arms; Charles Farrow, 18, Great Tower-street, E.C.

This invention consists in attaching to the soldier's rifle a small instrument, which by the pressure of the finger, holds the end of the cartridge while it is torn off, thus obviating the necessity of biting it. The simplest form of this instrument is shown attached to an Enfield rifle, and models of other forms are also shown.

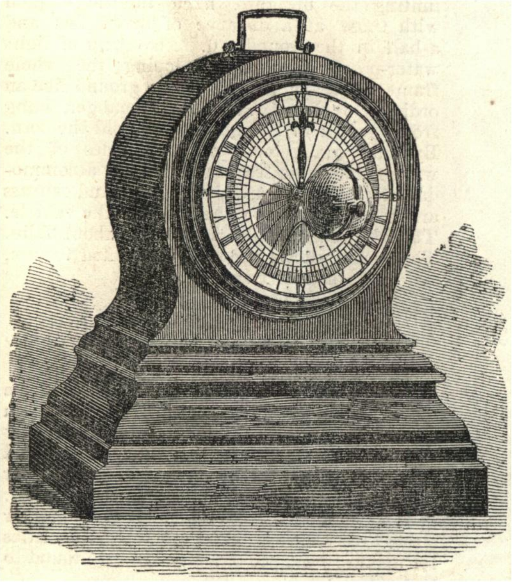
140. Shot for breech-loading Rifles; Capt. J. Norton, Rosherville.

This shot is well adapted for Sharp's and other breech-loading rifles. The screw reaching near to the point preserves the correct shape of the shot, whereas if it were of lead alone, the force of the explosion would put it out of shape when high charges are used to obtain a long range; the screw being thickest at its base, and comparatively lighter than lead, throws the centre of gravity into the fore part of the shot. The lead may be cast on a zinc screw if so preferred. (See *Military Spectator* for December 26, 1857.)

PHILOSOPHICAL APPARATUS, &c.

(*For the remainder of the Articles in this Section see Drawings.*)

150. Time Globe, or Planetary Clock; T. Sherratt, jun., 12, South-square, Gray's Inn, W.C.



This terrestrial globe rotates on its axis simultaneously with the pointer or hand, which makes one revolution before the 24-hour clock face in that time. Every hour is divided into 12 parts of 5 minutes each, the quarters and halves being more distinctly marked. The several portions of the day are also inscribed and coloured thereon, and the cardinal points given. In a right line with the pointer a black meridian passes over whatever place on the globe the time may be set for, showing it not only there but at all other places under the said meridian. On turning a button, which projects through the circular opening of the glass cover, it will cause the white meridian attached at the south pole of the globe to move over any place.

151. Patent Chronometrical Thermometer; W. H. Gauntlett, South Bank Iron Works, Middlesboro'-on-Tees.

This instrument is designed for the purpose of indicating the temperature of the atmosphere, and of permanently recording its variations upon a strip of paper by means of a marker. The strip of paper is rolled upon a drum, set in motion by clockwork. The marker obeys the impulse conveyed to it by the thermometric tubes, which expand or contract as the temperature varies. The strips of paper are ruled with lines. The horizontal lines represent the thermometric scale, the vertical lines correspond with the hours of the day and night, as shown in the accompanying diagram. When the drum has completed its revolution, a line will be found inscribed on the paper intersecting the hour lines, and the thermometric lines also, if there has been any variation in the temperature, and this inscribed line will show what the temperature has been at any moment of the day or night. This instrument is specially applicable for horticultural purposes.

152. **Astronomical Clock; Chr. Lange, 9, Salisbury-street, Strand, W.C.**

This clock has a free escapement, with the pendulum suspended above the movement, the object of this being to make the pendulum more independent of the movement than usual. The compensation is so constructed that it can be regulated without difficulty. The suspension is so constructed, that, in case the suspension-spring should break, the pendulum cannot fall down.

153. **Patent Reversible Hunting and Open-face Watch; F. B. Adams and Sons, 21, St. John's-square, E.C.**

154. **Time Indicator for use at night; Meyer Drukker, 47, London Wall, E.C.**

This is an arrangement for showing the hour at night by means of the shadow thrown on to a scale, from an index attached to the weight of a clock.

155. **Improved Surveying Level; Pastorelli and Co., 208, Piccadilly, W.**

The peculiarities of this instrument are—an improved tripod or staff head; the substitution of a ball-joint and clamp for the ordinary parallel plate screw; an improved mode of suspending the telescope; the adjustments are rendered less liable to derangement; and there are improvements in the arrangement of the diaphragms.

156. **Metford's Improved Levelling Staff; Pastorelli and Co.**

157. **Metford's Pocket Scales; Pastorelli and Co.**

158. **Improved form of Warrington's Microscope; Pastorelli and Co.**

159. Set of Meteorological Instruments; Pastorelli and Co.

This set of instruments consists of a barometer, maximum and minimum thermometers, dry and wet bulk hygrometer and rain guage.

160. Froude's Proportional Compasses; Pastorelli and Co.

The peculiarity of this instrument is this, that it can at once be set not only to any known ratio, but to any ratio which is not known, but which is only indicated by the length of two given lines; the instrument being set, the value of the ratio can be immediately ascertained by referring to a graduated scale.

161. Decimal Measures of Length; J. Simon Holland, Woolwich, S.E.

These measures are founded on the 16th of an inch as the basis. The two rules are marked wth the present inches and eighths. The fathom measure is 1,000 "steens," or sixteenths, long, and intended for the use of surveyors, builders, &c. Ten of these new square fathoms coincide with the present rod of brickwork, or equal to 271·28 of the present square feet; and 1,000 of these new fathoms make a new mile, of which 69·99886 make a degree of the meridian. Bulk measures, founded on the cubes of these length measures, are exactly four times the French bulk measures. The new gallon will, therefore, exactly equal four litres. (See *Mechanics' Magazine* for March 27, 1858.)

162. Perspective Models; E. L. Paraire. Exhibited by George Rowney and Co., 51, Rathbone-place, W.

These models are intended for teaching the principles of perspective. The objects are solid, as in nature; lines passed from their various points represent visual rays, which intersect a transparent plane, pourtraying the picture, which corresponds with mathematical accuracy to the object itself, the manner of obtaining the vanishing points and other perspective operations being clearly shown.

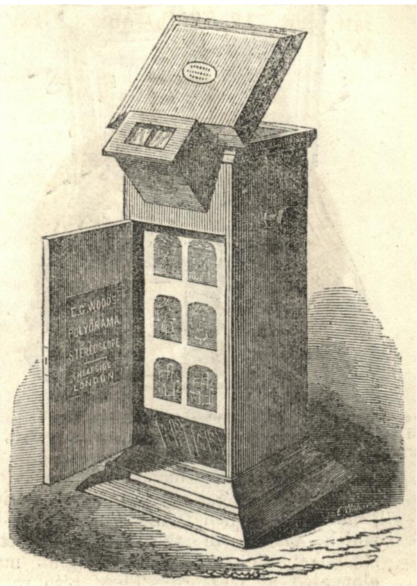
163. Stereoscopic Camera; Alexander J. Austen, 2, St. John's-hill, Battersea-rise, S.W.

This camera is stated to possess the following advantages:—1. It can be worked without a dark room or tent. 2. It has a new arrangement for securing the bed of the camera being perfectly level. 3. It has a shutter instead of a cap, which can be opened and shut without shaking the camera. 4. There is an arrangement of various-sized diaphragms, on a circular disc, fixed on the camera, instead of loose ones. 5. It has an arrangement to enable the radius rods to be easily fixed, so as to obtain the coincidence of the two pictures, according to their distance, without the necessity of frequent shifting from side to side as at present.

164. Patent Dioramic Stereoscope; E. Erskine Scott, Dundee.

In this instrument the double eye-piece is so arranged that the rays from the two pictures come to the eyes as if they radiated from a point of medium distance, such as that at which we are in the habit of looking at natural objects. This improvement is effected by using in the eye-piece two entire lenses, and placing their centres a little further apart than the distance betwixt the eyes of the observer, so that the rays from each picture are slightly refracted outwards.

165. Polyorama Stereoscope; E. G. Wood, Cheapside, E.C.

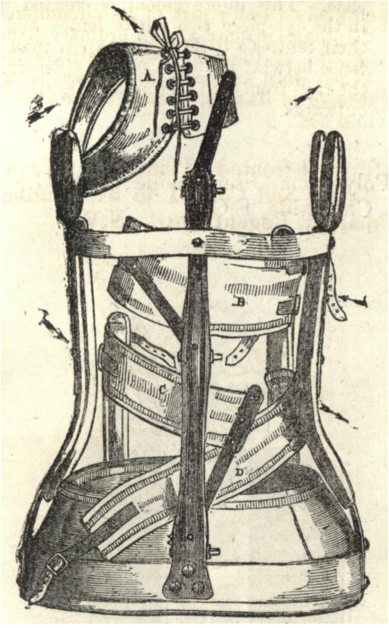


This consists of an upright rectangular-shaped box, rising from an ornamented base, having at one side a sloping box, containing a pair of prismatic stereoscopic lenses. The top of the instrument can be raised to any required angle, and as the inside of this is lined with silvered glass, any required degree of light can be thrown upon the pictures, which are placed below in the axis of the lenses. Across the box is fixed a square block, reaching from side to side, and turned round by moving the brass head on the outside. This block, by means of a spring and notched wheel, can be moved exactly half of a revolution at a time. The pictures are formed into an endless band, and hang upon this block, and are brought in succession before the lenses.

166. Patent Photogen, or Light Generator, to be used for taking Photographs at Night; John Moule, Hackney road, N.E.

This apparatus consists of a convenient arrangement for burning pyrotechnic compositions for taking photographic portraits at night, at the same time preventing the noxious vapours from escaping into the room. The admission of air is so arranged as to prevent the vapours from obstructing the light emanating from the burning composition. The vapours pass from the top of the apparatus through a tube into a chimney.

167. Spinal Apparatus; Bernard Brodhurst, 20, Grosvenor-street, W.



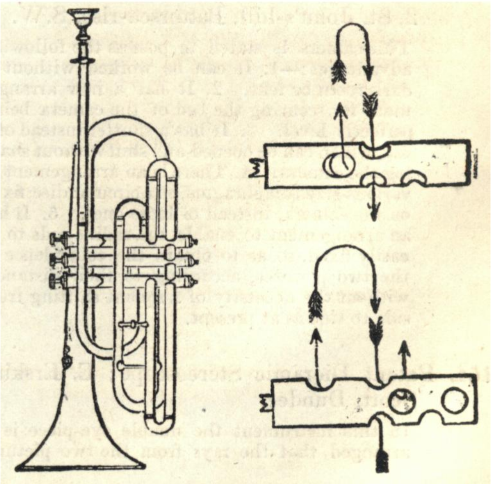
The arrows attached to the engraving denote the directions of the applied forces:—A. The shoulder sling. B. the dorsal, C. the lumbar, and D. the pelvic webbing bands.

This apparatus is composed of a pelvic belt, having two lateral uprights, the superior extremities of which terminate in crutch-heads, which, placed in the axillæ, support the shoulders. These lateral uprights may be elongated at pleasure. They also rotate on their inferior extremities at their attachments to the pelvic belt by means of screw-centres. A perpendicular steel bar (vertebral stem) is affixed to the centre of the posterior segment of the pelvic belt, and is carried as high as the upper extremity of the dorsal spinal curve; it is united near its upper extremity by means of a transverse band (scapular band) to the lateral uprights below the crutches. This forms a solid frame, which cannot be tilted when lateral pressure is applied, as generally happens to other spinal instruments. The vertebral stem supports three levers, all of which are moved by rack and pinion joints. The lowest of these gives attachment to the webbing band, which supports the convexity or which depresses the superior extremity, as the case may be, of the lumbar curve. The middle lever gives attachment to the webbing band, which supports the convexity or which raises the lower extremity of the dorsal curve, as it may be a primary or a secondary curve. And the upper lever is connected with the shoulder sling, which sling being applied to the shoulder and embracing the scapula and the ribs which correspond to the upper extremity of the dorsal curve, acts upon the curve to unband it. The sling is composed of stout linen, enclosing gutta percha, which is accurately moulded to the form. Further, the lumbar and dorsal webbing bands are attached in front to two perpendicular levers, which are placed on the anterior segment of the pelvic belt and which are moved, as well as the posterior levers, each by a ratchet-wheel motion. Also, a webbing band is connected with one of the anterior levers, and passing over the highest ilium is fastened to the opposite side of the pelvic belt. The action of the instrument is as follows:—When the dorsal is the primary curve, its convexity is supported by the webbing band, while the upper extremity of the secondary or lumbar curve is depressed by the oblique action of the lumbar band, and the superior extremity of the dorsal curve is upraised by the action of the upper or cervical lever on the shoulder and side of the thorax. The resistance which is thus obtained has generally been overlooked in other spinal apparatus. But should the lumbar be the primary curve, its convexity is supported by the lumbar webbing band, which is attached to the lowest lever, while the resistance is gained by means of the webbing belt which passes over the ilium; and the curve is unfolded by uplifting the lower extremity of the dorsal curve by means of the webbing band attached to the dorsal lever. When much rotation of vertebræ is superadded to lateral curvature of the spine, a metal plate with several ratchet motions is attached to the vertebral stem of the instrument, by means of which pressure can be made from behind forwards. And when a cervical curve has to be treated mechanically, an instrument formed on the same principle may be applied, being firmly attached to the neck and shoulders, while the extending force is applied to the mastoid process of the occiput, at the same time that the convexity of the curve is supported.

168. Patented Improvements in Artificial Teeth; J. Maurice, 306, Regent street, W.

This invention consists in the application of vulcanized or mineralized India rubber as a lining to the gold or bow frame, and as a covering to the fastenings used for securing artificial teeth in the mouth. This is said to secure a more accurate fit, and to give a better support to the teeth.

169. Improved Cornet-à-Piston; Joseph P. Oates, Erdington. Exhibited by Thos. Dawkins, 7 and 8, Little Warner street, Clerkenwell, E.C.



The improvement in this instrument consists in the construction of the valves for changing the direction of the current of air from the main wind-way into the supplementary ones, by means of which the various intonations, termed the valve notes, are produced. By this arrangement of the openings in the pistons, the direction of the passage of the current through them in producing the valve notes is made so entirely to assimilate with that of the open notes, that the quality of tone and correctness of tune of these notes are identical.

170. Revolving Pianoforte Hammer; E. Thompson, Brigg.

The head of this hammer is circular, and is covered on every part of its circumference, in the same manner as the ordinary hammer is covered at the point which strikes the wire. When worn at one point it may be made to revolve on its axis, so as to bring another part into use.

171. Elliptical-fronted Pianoforte Keys; H. Brooks and Co., 31 to 34, Cumberland-market, Regent's-park, N.W.

AGRICULTURAL IMPLEMENTS, MACHINERY, &c.

(*For the remainder of the Articles in this Section see Drawings.*)

180. Patent Horse Hoe; John D. Garrett. Exhibited by Garrett and Sons, Leiston Works, Saxmundham, Suffolk.

The old arrangement for adjusting the mortice-bar by hand, or by hand and levers, is shown on one side of the model, and the improved method on the other; the latter shows the mortice-bar supported at its opposite ends, by joining to it pairs of pendent rods or levers, which, in proportion as they are opened out or brought nearer together, raise or depress the mortice-bar, and effect the desired change in the angle of inclination of the hoes. The raising or lowering of the mortice-bar is accomplished as follows:—the screw-shaft must be turned by means of the winch-handle, which projects beyond and in rear of the framing; the rotation of this shaft will cause the nuts on the pendent-rod or lever to approach to or recede from each other, and thereby increase or diminish the space between the mortice-bar and the framing of the implement, by which means the angle of the inclination of the hoes to the ground will be changed as desired. The principle of this hoe is, in all other respects, the same as was patented by Mr. Garrett, senior, in the year 1843.

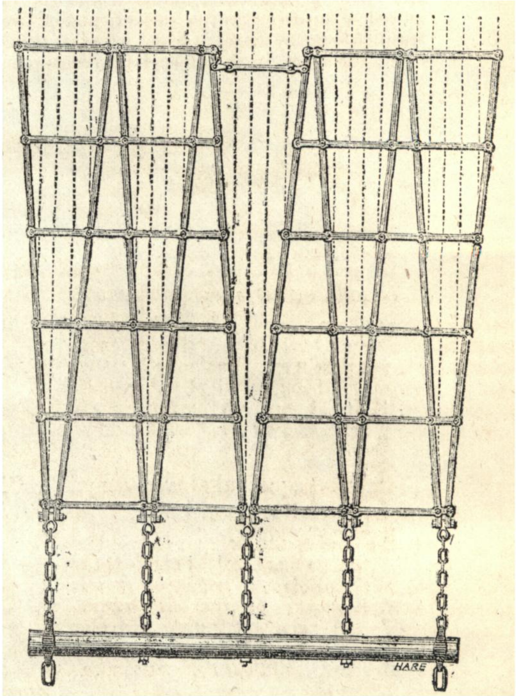
181. Agricultural Steam Machinery; William Hawkes, Eagle Foundry, Birmingham.

In this invention the tractile power acts, in a direct line, upon the implement to be moved, the engine being placed lengthways in the line of draught. Two drums, of large diameter, are worked alternately by a pinion being made to engage alternately in spur wheels on the drums. The implement is drawn backwards and forwards across the field by means of a rope or chain, working over a snatch-pulley attached to an anchor-carriage placed on the opposite side of the field. The engine is upon wheels at right angles to its longitudinal axis, and both the engine and anchor-carriage are moved, from time to time, by means of chains made fast at one end, and coiled over pulleys worked by the engine.

182. Model of a Farm, under Burcham's Circular Method of Tilling Land by Steam or Horse-power; C. Burcham, Heacham, Lynn, Norfolk, and 8, Upper John-street, Golden-square, W.

This system of agriculture subdivides the entire farm into small plots or circular allotments (either half acres or acres). A steam-cultivating platform is then made of a length suitable for executing any required operation by a circular sweep over the surface of each plot.

183. Patent Harrow; J. Emery.



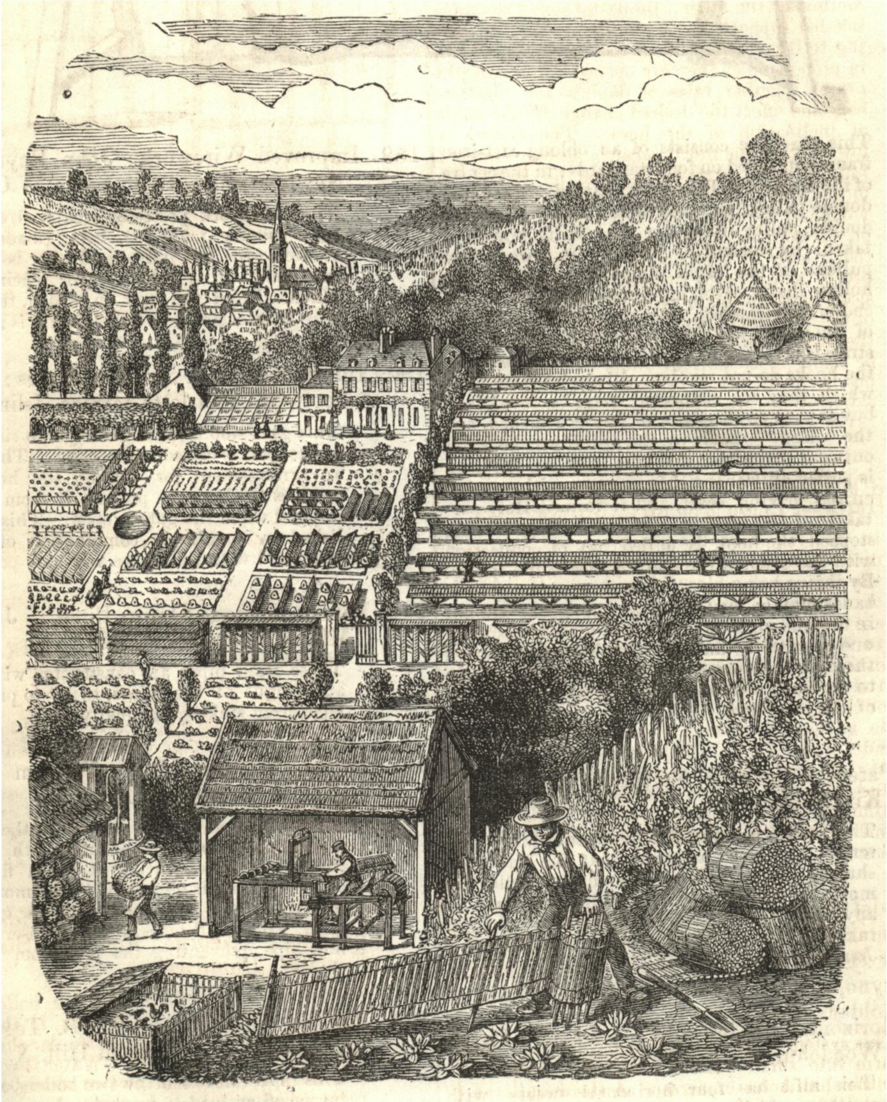
The chief novelty in the construction of this harrow is in the wedge-like arrangement of the tooth-bars, and the mode of gearing them to the whippletree. All the teeth in the harrow are brought into longitudinal rows, in alternate cross parallels, a position that greatly favours an equal and effective action of the harrow on the soil. The arrangement also admits of such a mode of gearing to the whippletree that every tooth in the harrow has the full force of the draught direct upon it. The model exhibited, and the annexed woodcut, represent a light seed-harrow for one horse.

184. Patent Steam Cooking Apparatus for Cattle Feeding; George Forsyth, Stakeford Foundry, Dumfries.

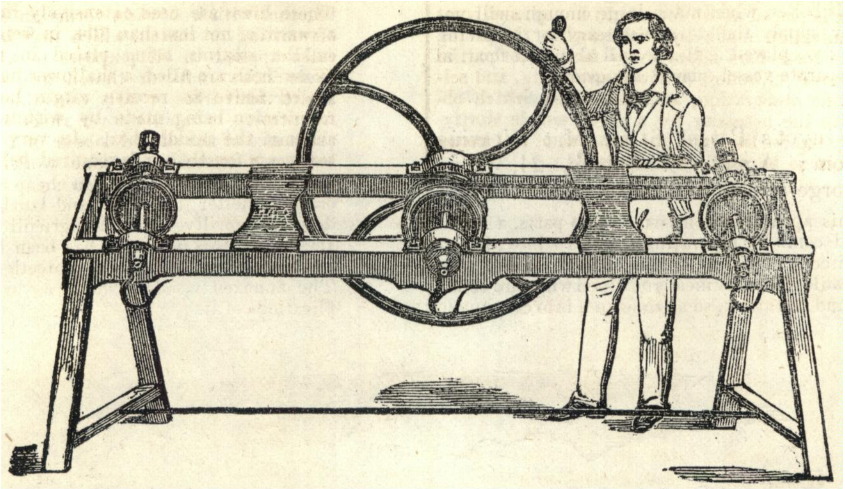
In this apparatus there are two boilers, the outer one being set in brick-work, in the usual manner, and the inner one of similar shape, but smaller, inserted inside it. Water is conveyed into the space between the two boilers, and the roots, or other food to be steamed, are put into the inner boiler, and rest on a perforated false bottom, and are covered close with a lid. Fire being applied, and steam raised (which will blow off at a safety-valve when about 3lbs. pressure), it will pass to the under side of the false bottom, and rise through it to the roots. This boiler, when made large enough, will not only supply the steam necessary for preparing the food placed in it, but will also cook food, in a separate vessel, placed alongside.

185. Dr. Guyot's Patent Straw Mat Weaving Loom; Agent, S. Sidney, 24, Great George-street, Westminster, S.W.

This apparatus consists of two parts, a frame and comb for separating the straw into the required quantities for the weaver, and a two-treadled loom, by means of which wires are bound round the straw, so as to form it into continuous bands. This loom can be worked, after a few hours' practice, by a boy of twelve years old, or by a blind man or woman. The material, knotted together with iron wire, forms an endless roll of matting or thatch, which may be economically applied to all purposes to which hand-made straw mats or thatch are applied; to shelter fruit trees, or early vegetables or flowers, from frost—to rapidly cover ricks without the assistance of the skilled labour of the thatcher—to protect brick or stone work from frost during erection—to provide a cheap and rapidly erected shelter for ewes and lambs on open downs, or for live stock at agricultural shows. In France this machine has been found very useful, as producing a cheap protection for vines. The annexed woodcut shows a variety of applications of it.



186. Patent Straw and Hay-band making Machine; J. H. Simpsou, Petersham.



This machine consists of an oblong cast-iron frame supported on four standards; in the centre of the frame a hollow shaft, with fly-wheel and double pulley, revolves in bearings. From the double pulley fixed on the shaft, power is taken, by means of bands, to two other pulleys of the same diameter, fixed on the hollow shafts revolving in bearings near each end of the framing. At the outer extremities of the shafts, are the hooks to which the hay or straw is attached. Under ordinary circumstances the hooks do not revolve, although the shafts to which they are connected may be revolving; but as soon as the straw or hay is attached, and the "drag"—made by the operator as he walks outward from the machine—put on, the hook is pulled outwards till it engages with a catch on the driving shaft, and it immediately partakes of its motion; on the "drag" being stopped, the hook is pulled out of connection with the catch of the shaft by means of a spring. By this arraangement three separate lengths of bands may be made, and as the hooks are not in motion when no bands are attached, should one operator be finished with his length before the others, he can commence a new attachment to the hook without necessitating the stoppage of the other two.

187. Patent Adjustable Scythe; James Payne, Kirkcudbright.

This scythe is adjustable by means of nuts and screws, and is so arranged that the blade will shut up like a knife. The short handles are moveable up and down the snaith, and fixed at any particular place by simply screwing them round with the hand. (See *Practical Mechanics' Journal*, June, 1857.)

188. Horizontal Wind-mill; David Davis, Woodchurch, near Tenterden.

This mill has four horizontal sweeps, with shutters, which spontaneously shift so as to be driven round by the wind, whatever quarter it may blow from.

189. Improved Wirework; John Reynolds, 57, New Compton-street, Soho, W.C.

This wirework possesses greater strength than that usually made, it being made of hard twisted wire, and galvanised after being manufactured. It is intended for fencing of all kinds. From the way in which the twisted wire is interlaced, no other fixing is required.

190. Improvements in Stops for Gates; Andrew Scott, 15, Charlotte-terrace, Islington, N.

This gate stop is arranged so as to rise and fall as the gate is closed and opened. There is also an arrangement for closing the hole which receives the bolt, to prevent it from becoming clogged when the gate is open. This is accomlished by a suitable combination of gearing connected with the hinge and gate-post.

191. Patent Ledge Drain Pipes; John W. Milnes, 389, Strand, W.C.

These drain pipes are constructed with a ledge and tongue at the joints, so as to prevent the pipes from sinking unequally.

192. Patent Watering Pot; William Palmer, 156, Western-road, Brighton.

This invention consists in making the rose of a watering pot of an oval form with a convex surface, and perforating it with fine holes and attaching it obliquely to the mouth-piece. There is also a percolator, of a cylindrical form, with small holes, which is inserted in the flow-pipe, preventing the rose from becoming choked.

193. Bar and Slide Hive; W. B. Tegetmeier, St. James-lane, Muswell Hill, N.

This hive consists of two or more boxes, each furnished with loose moveable bars, for the attachment of the combs, and slides. It presents all the advantages of an ordinary bar hive, with the great practical convenience attending the use of slides. Two boxes are stocked with a swarm, the slides being withdrawn from the lower one, and, when they are filled, a third shallow box is placed above for virgin honey, and communication made by withdrawing the slides. The loose bars afford every facility for partial removal of honey, artificial swarming, and scientific observation, and the slides, which obviate the necessity for a cover, enable storifying, top feeding, and the removal of full honey boxes to be easily accomplished.

194. Stewarton Bee Boxes. Exhibited by W. B. Tegetmeier.

These hives are used extensively in Scotland. a swarm of not less than 5lbs. in weight, or two smaller swarms, being placed in two boxes. When both are filled, a shallower honey box is placed above to receive virgin honey, communication being made by withdrawing the slides of the middle box. In very productive seasons, a fourth box is required below.

BUILDING, SANITARY, AND DOMESTIC APPLIANCES.

(*For the remainder of the Articles in this Section, see Drawings.*)

199. Proposed Improvement of the Banks of the Thames; J. F. Wieland, Rossbank House, Port Glasgow.

These models are intended to show a section of the scheme proposed for an embankment of the Thames, a removal of the London sewage, an extension of the wharfs and quays, a new road from the west to the City, a subterranean railway from Charing-cross to London-bridge on the north side, and on the south side the same advantage except with respect to the railway, which would be one, as shown in smaller model, to connect the South-Western and South-Eastern Railways.

200. Specimens of Caen, Bath, and Bolsover Stones, treated under the Patent of Benjamin H. Paul, Torrington-street, W.C.

In these specimens, the faces to which a paper label is attached, have been treated; those which have no label are in their natural state. The small pieces of stone have been prepared eighteen months, the large pieces within the last week. This invention consists in applying to the face of the stone, either before or after it has been put in its place in a building, solutions of aluminate of potash, or aluminate of soda or similar compounds, either alone or together, with finely divided durable substances, such as china-clay, &c., and in such manner as to fill up the superficial pores of the stone, and also to render the external portion generally more dense and compact, thereby diminishing the tendency to decay.

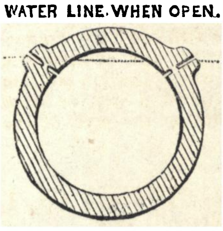
201. Patent Plastic Arch; C. C. and A. Dennett, Nottingham.

202. Improved Method of Laying the Footings of Brick Foundations; John Harrisson, 3, High-street, Homerton, N.E.

In this arrangement the external angle bricks are 9 in. square and 11½ in. square, which prevents their being removed like the common 4-inch brick. The set-offs are made on every alternate course.

203. Patent Opercular, or Lidded Pipes; Henry Doulton, High-street, Lambeth, S.

The invention consists of two flanges, or ribs, running lengthways, and comprising about one-third of the circumference of the pipe; through these flanges a partial incision is made before burning, in such a manner that, at any time, by inserting a chisel in the groove, the segment included between the ribs can be readily detached, without any risk of fracture or damage, either to itself or to the remainder of the pipe; and, after examination, the lid or cover so detached is easily replaced, and, from having been burned in one piece, this lid fits exactly into its original position. By this contrivance access can be obtained, if necessary, to any part of a drain, or even to the whole length if required, without in any way disturbing the pipes in their bed, or lessening their capacity; a junction can be inserted, or the lid of a pipe removed without fracture or injury, and this is effected without increasing the number of joints or allowing any escape of the liquid contents, or entry of the surrounding soil. The strength of the pipes is increased by the addition of the flanges or ribs.

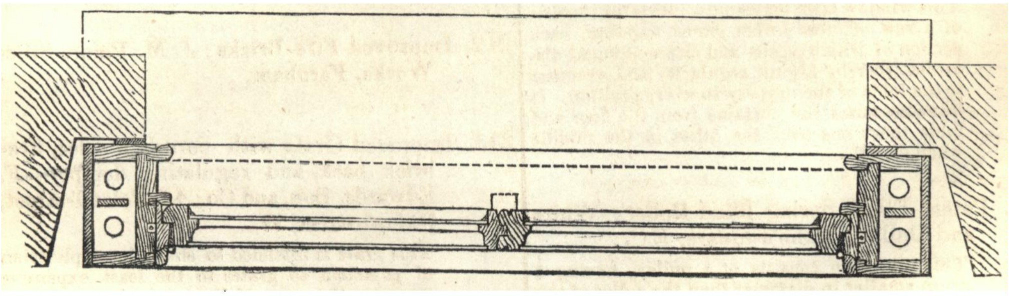


Cross Section.

204. Cleansing Tube for Drain Pipes; John Harrisson.

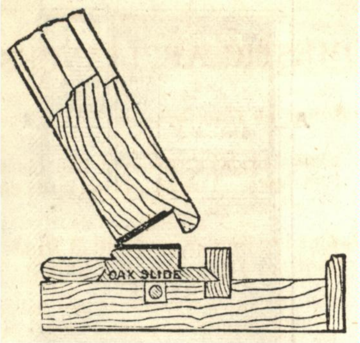
These tubes can be laid with the ordinary drain pipes at convenient distances, and have an opening in the side 20 inches long, covered with a complete flange, so that cement joints can be made. The sides of the tube are brought up sufficiently high for the complete diameter to be preserved.

205. Patent "Oak Hall" Window; West and Hubbell, 25, Rupert-st. Haymarket, W.



HORIZONTAL PLAN.

In this window the upper half of the sash slides down to the bottom, and the lower part is in two halves, and may be raised as far as required, or opens up like a door. When shut one bolt secures them all. They are so hung as to be less liable to accident than ordinary windows, as the sash cords, &c., are thoroughly protected from the weather.



SECTION OF OAK SLIDE & BOXING

206. Patent Self-Acting Sash Fastenings; J. Decimus Tripe, Commercial-road, E.

The peculiarity of these fastenings consists in their having a metal joint so constructed as to prevent rattling of the sashes, allowing a self-acting lever to lock the sash when the window is closed. A second arrangement consists of a self-acting lever, which, when placed in position on one sash, inpinges against a stop or stops fixed at different heights on the style of the other sash.

207. Patent Window Sashes; Dick and Co., 1 New Inn-buildings, Strand, W.C.

This is an arrangement for allowing the window sashes to be renewed or taken out for cleaning, &c., without removing the beading.

208. Improved Sash Window; Benjamin Shaw, Wellington, Salop.

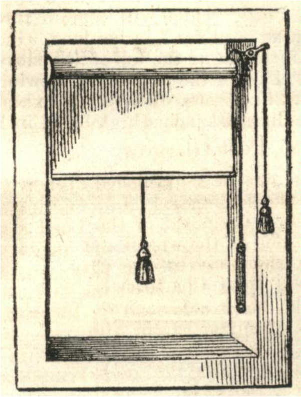
This window is so arranged that the outside of the window may be easily turned inwards, so as to enable it to be cleaned within the room.

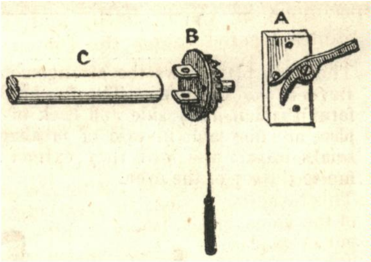
209. Patent Trellis Lath; Fairclough, Brothers, Liverpool.

This window lath, for hanging curtains, consists of a row of cross levers joined together, each portion of which opens and closes at equal distances, thereby giving regularity and evenness to the folds of the drapery in every position. It likewise raises the curtains from the floor and folds them one over the other in the middle when drawn.

210. Patent Elastic Spring Blind Roller; White and Bull, St. John's-square, E.C.

This invention consists of a pulley, having a drum smaller in diameter than the roller of the blind, and attached thereto by two arms, a ratchet being cut in the outer edge of the pulley, for a catch to work in, which is fixed to the bracket, in which the pin of the roller revolves, a small cord being fastened to the drum of the wheel, and the other end attached to an india rubber spring, which is then fixed to the side of the window frame.





A. Bracket and catch. B. The Pulley-wheel, showing the method of attaching it to the roller by the arms. C. Portion of roller.

211. Patent Register or Chimney Valve, and Improvements in the Construction of Fireplaces; E. A. Spurr, 3, Newton-road, Bayswater, W.

The chief features of this invention are, a solid brick, arch-built, through the whole thickness of the wall, thereby adding to the strength, and removing one of the causes of a smoky chimney, viz., the large open space immediately over the fire; the commencement of the flue at the crown of this arch, and affixing to the lower part of it, either built into the brickwork or attached to the ironwork of the stove, a new kind of register or valve.

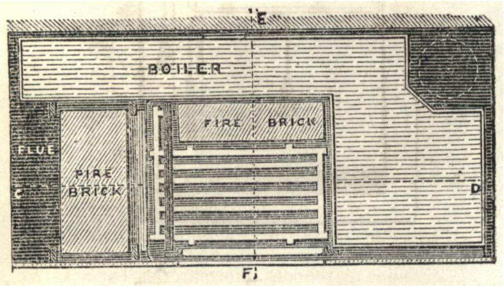
212. Improved Fire-Bricks; J. M. Paine, Silica Works, Farnham.

213. Improved Grate with porcelain sides, fire-brick back, and regulating damper; F. Edwards, Son, and Co., 42, Poland-street, Oxford-street, W.

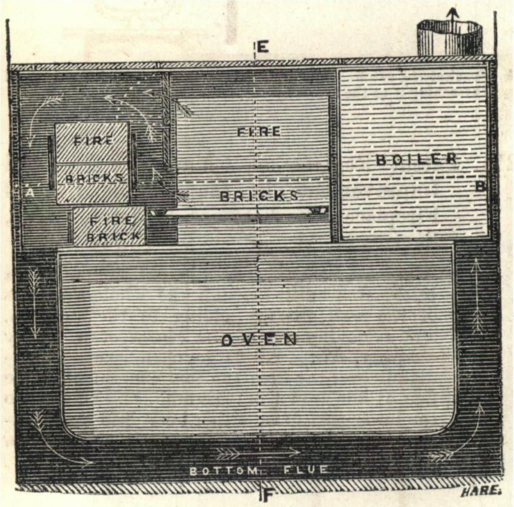
This grate is intended to show the application of porcelain to grates in the least expensive manner; the price of the specimen one shown, with either of the pattern tiles, being scarcely more than that of a common register grate.

214. Patent Economical Model Lodging House Kitchen Stove; J. Cundy. Exhibited by Wm. Addis, 6, Leicester-street, Leicester-square, W.C.

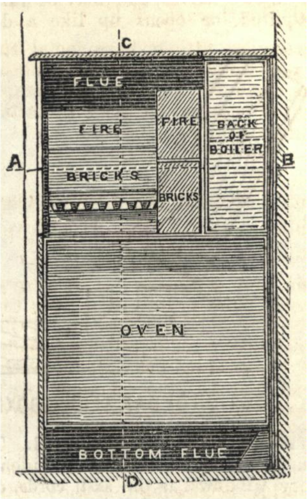
This stove embraces in a compact form an oven 18 inches long, 11 inches high by 14 inches deep, a boiler which will contain three pails of water, an open fire 7 inches long, 9 inches high, by 6 inches deep, the top of the stove forming a hot plate for the purpose of stewing, boiling, and heating irons. The stove exhibited is 24 inches long, 24 inches high by 14 inches deep.



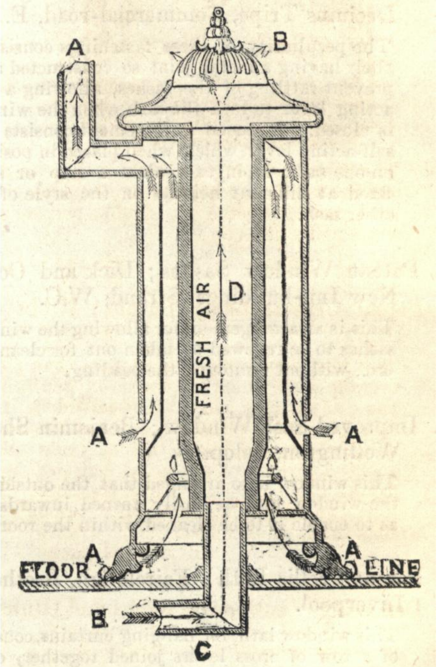
The above plan shows the arrangement of the stove above the oven. The fire-bricks which form the left-hand side and back of the fire-place are moveable in case of breakage; these bricks impart the heat they extract from the fire to the top of the oven.



The above longitudinal section shows the action of the stove when the oven is in process of being heated; the arrows indicate the passage of the products of combustion over the bricks down the left-hand flue of the oven, under the oven and from thence up the right-hand flue into the chimney, by which arrangement the oven becomes equally heated over the whole surface. The following cross section shows the relative positions of the oven and boiler, also the construction of the fire-place from front to back. The 4-inch pipe which connects the stove with the chimney is fitted with a damper, to economise fuel when the oven is not in use. A 24-inch stove will cook 30 lbs. of meat, besides vegetables, at the same time.



215. Patent Sanitary Gas Stove; J. Cundy. Exhibited by Wm. Addis.



In the annexed woodcut, which shows a vertical section of the stove, the arrows A indicate the course the vitiated air of the room takes in its passage through the stove into the chimney; D the earthenware cylinder through which the external air ascends into the room at a warm temperature; C the pipe to conduct the external air into the earthenware cylinder.

216. Deflagrating Gas Stove; F. X. Kukla, 194, Pentonville-road, N.

This is an adaptation of the principle of the Davy lamp to the construction of a gas stove.

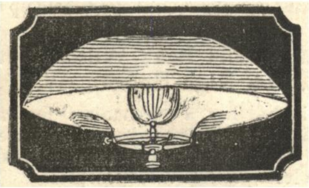
217. Opal and Coloured Glass Gas Fittings; W. Reichenbach, 33 and 34, Borough-road, Southwark, S.E.

These glass fittings have metal tube linings, to give additional strength; the branches are also joined directly on to the stem, thus avoiding the necessity for the introduction of a dish as in the ordinary gaseliers.

218. Patent Petrolene, or Liquid Gas Lamps; Nibbs and Hinks, Hockley-hill, Birmingham.

This lamp is constructed to burn almost any description of hydro-carbon; but that to which it is particularly adapted is "Young's Patent Mineral Oil." The cone and shade-holder are cut by machinery from one entire piece of metal, and the other parts are so arranged as to cause no accumulation of heat. This lamp can be lighted instantly.

219. Deflecting Shade for Gas and other Lamps; Nibbs and Hinks.



The lower part of this shade is of clear glass, and the upper part is coated with enamel; it is thus made to serve the double purpose of a shade and a deflector.

220. Patent Crystal Lamp Burner; Nibbs and Hinks.

This invention consists of a glass cone placed over the wick, which throws the oxygen into the flame at a higher point than usually done. Outside this cone is placed an ordinary shouldered chimney, the shoulder of the chimney causing a second current of air to be deflected to the flame at some distance above the cone. This second current of air is supplied through four slots in the glass-holder.

221. Deflecting Ventilator; Nibbs and Hinks.

222. Smoke-preventing Chimney Cap; Nibbs and Hinks.

223. Maltese Chimney Cap; John Leighton, 40, Brewer-street, Golden-square, W.

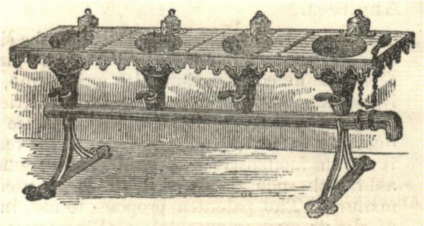
This is intended to prevent downward draught, and regulate the discharge of smoke.

224. Chimney Top; William Sandilands, Inveresk, Midlothian, N.B.

225. Patent Burglary Detector; T. Turner, Wolverhampton, and City-road, E.C.

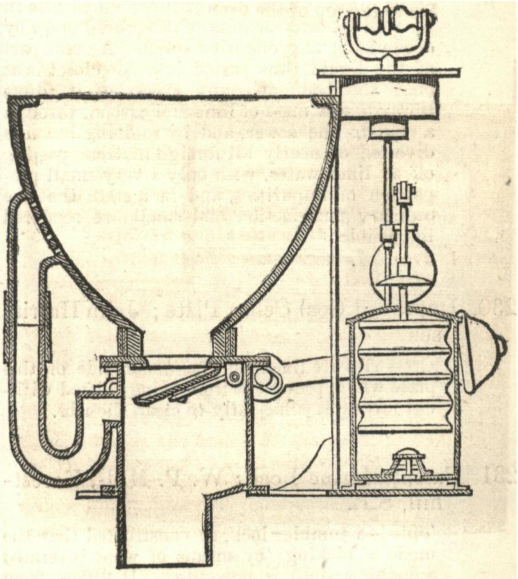
This apparatus is intended to be fixed upon the mantle-piece in a sleeping room. Wires are attached to it, and conveyed to doors, windows, &c., and there is an arrangement of cranks for setting a bell in action, as also for striking a light, on any entrance being made to the house.

226. Patent Wash-hand Range; Walter McFarlane and Co., Glasgow.



This apparatus consists of a range of basins, the whole being constructed of cast iron. It is intended for schools, reformatories, barracks, &c.

227. Regulator Valve Closet: Charles Botten and Son, Crawford-passage, Ray-street, Clerkenwell, E.C.



In fixing this closet, all that is necessary is to set it on an ordinary trap, bringing a supply pipe to the union of the valve. As no service-box, cranks, or wires, are required, this pipe maybe branched from any main pipe in a building, and a number of closets supplied from one cistern, which may be at any distance therefrom. The bottom valve shuts against a ring of thick India rubber bedded into a metal seating, preventing leakage from unsoundness of valve. A perfect flush of water is obtained, no matter how carelessly the handle is pulled or suddenly let down.

228. Improved Water Closet; D. H. Lamb, Berwick.

This closet has the seat constructed like a chair, with an upright back for the support of the cistern, which cistern fills by a self-acting valve-tap for high or low pressure, each time the closet is used. The cistern cannot freeze, as it is always empty except when in use. It can give any quantity of water each time it is used.

229. Mode of Utilising and Deodorising Sewage Matters, &c.; Dr. John Lloyd, Llangefni, Anglesea.

This invention consists in applying the sifted ashes or breeze and the cinders from fire-places, alone or in combination with quick-lime, and in certain cases assisted by small quantities of chloride of lime, to remedy the nuisance produced by the sewage of houses, and thus reduce it to an inoffensive state, to be easily removeable with such refuse, and so to be used as manure. The patentee proposes to use, inside of closets, &c., moveable metallic receptacles, of a square shape, divided by a partition, so as effectually to separate the solid from the liquid deposits. The ashes and lime rapidly solidify, and even fossilize the solid deposits, and convert them to masses without smell. The front compartment of the closet it is proposed should always, if possible, be partially filled with the mixture of lime and ashes. It acts in this manner:—the quantity of liquid passed into the closet forms a mass of wet lime, which acts in its well-known capacity of absorbing gases by deodorising any offensive smell. A great part of the liquid thus passed into the closet is at once absorbed, and any excess of it filters through the mass of lime and carbon, through a pipe to the sewer, and by so doing becomes divested of nearly all foreign matters, passing off as lime water, with only a very small proportion of impurities, and in a state that the ordinary putrefaction and smell are rendered impossible.

230. Improved Coal Cellar Plate; John Harrisson.

Cross ribs are fixed on the under side of this plate which prevent it from being shifted without raising it sufficiently to clear the ribs.

231. Patent Marine Lock; W. P. Mills, Forest-hill, S.E.

This is a tumbler lock, so constructed that the mode of picking (by means of what is termed a double action) is prevented. It differs from all other tumbler locks in having the spring formed out of the tumbler itself.

232. Spring Lock; W. P. Mills.

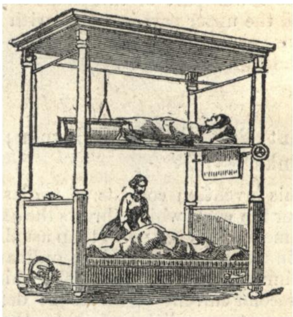
In this invention the key hole is covered by a piece of card or soft metal, the catch of the bolt passing through a slot cut in it, and by means of a private mark at the back of this piece of card, papers or valuables under such security are prevented from being tampered with.

233. Patent Lock; W. Bond Paul, Langport, Somersetshire.

There are three important features in this lock. 1st. The bolt and tumblers cannot be reached simultaneously. 2nd. No impression of the tumblers can be taken whereby a false key could be made. 3rd. The bolt is not acted on directly by the key, so that the length of the bits has no reference to the distance the bolt is thrown, and consequently the key for any lock, however large, may be made conveniently small. This lock has a slide of peculiar form, and a second stump to the bolt. The key, which fits into a pipe, places the tumblers in the position for unlocking by passing under one end of them. To this pipe is fixed a lever which acts both on the bolt and the slide. During the rotation of the key, and consequently of the pipe, the slide is drawn over the tumblers and shuts off all access to them; the lever then passes on to the bolt, which can be reached by the lever only. The stumps are so placed that the lower one cannot be brought into contact with the tumblers until the other has entered a slot in the slide, which it cannot do whilst any part of the tumblers is exposed. The tumblers have all the same outline, so that when the bolt is locked they lie perfectly flush with each other. During the process of unlocking they are held up by friction.

234. Patent Invalid Bed; Wilson, Newton, and Co., 144, High Holborn, W.C.

This bed has a mechanism for raising the patient, to enable the bed to be made, as well as for placing him in any required position with the least possible inconvenience.



235. Invalid Couch; Thomas Greenacre, Millwall, Poplar, E.

This combines a bed, easy chair, leg-rest, &c. The back-board can be set to any angle. As the back rises or falls, the arms keep level. The leg-rests can also be raised or lowered either together or separate. The India rubber bed is made in separate compartments, so that its rigidity may be regulated.

236. Nightingale Bed; Thomas Dixon, 7, St. James's-place, Hampstead-road, N.W.

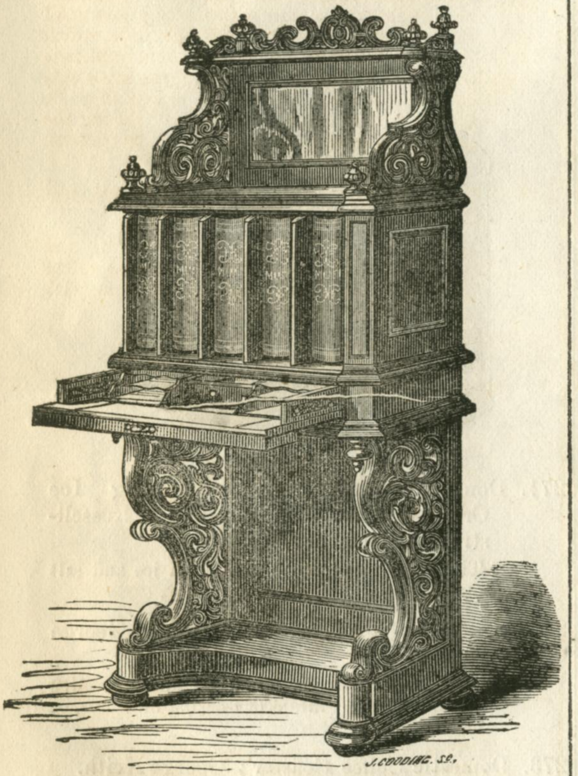
237. Stand for Cheval and other Dressing Glasses, Fire-Screens, Easels, &c.; Henry Dolman, 10, Nelson-street, Greenwich, S.E.

This invention consists of a hollow pillar rising from a base or foot; inside the pillar is a rod, on the front of which is a toothed rack, which is worked upwards or downwards by means of a toothed wheel on a spindle, with a handle outside the pillar; the spindle is provided on the outside of the pillar with a ratchet wheel and fall, to keep the rod at the required elevation. The top of the rod is provided with a boss and cross-bar, acting vertically and horizontally, so as to place the glass or other object in any required position.

238. Patent Nursing-Chair; Wilson, Newton, and Co.

239. Exercising Apparatus for Infants; J. Clifton, 541, Oxford-street, W.

240. Music Canterbury, with Writing Desk; H. Brooks and Co.


J.COODING. Sc.

241. Patent Dining Table Expander; Fairclough, Brothers, Liverpool.

This model shows a principle by which any length of table may be opened and closed by the application of a short screw. Nuts are fixed in the backs of the slides, and each one being acted upon successively by the turning of the handle the table expands to its full extent. In closing, each slide runs off on a neck at the head of the screw as the succeeding one is drawn up. The advantages possessed are that there is no weight of screw or tube in the centre of the table when opened; and, only one of the slides being acted upon at a time, greater freedom in working is secured.

242. Patent Mangling and Calendering Machine; J. Chedgey, the Grove, Southwark, S.E.

The peculiarity of this machine consists in the application of glass as its bed, the rollers being also made of the same material. The rollers, it is stated, have borne a pressure of 30 tons, and are ordinarily worked under a pressure of 10 tons. The reversing motion is effected by a lever and cam. A machine on this principle has been in use in the Queen's laundry for some time past.

243. Patent Glass Rollers and Cylinders; J. Chedgey.

244. Patent Box Mangle; Richard Howland, 3, Long-lane, City, E.C. Exhibited by Davies and Hunt.

The principal novelty is in the lift, which is self-acting, and is put in operation by pressing a knob in front of the frame, thereby obviating the danger of reaching over the mangle whilst it is in motion. The iron work is so arranged as to pack into the box for convenience of exportation.

245. Washing, Wringing, and Mangling Machine; Thos. Briggs, 173, Woodhouse-lane, Leeds.

246. Patent Washing Machine; J. L. Hancock, 62, Pentonville-road, N.

This machine consists of a water-tight case, in which rollers are placed near the bottom, carrying an endless canvass band, to which various loops are fixed. The articles to be washed are partly drawn through these loops. A third roller presses by its weight upon the top of one of the others, and consequently upon the articles as they travel round the band. The case is to be filled up to the lower edges of the rollers with hot suds; the articles should be soaped before being placed in the machine.

247. Spring Balance Washing Machine; Peter Gabbitass, Worksop.

This machine consists of a cylindrical tub, a spiral spring, a wooden horse, and revolving knuckled rubbers.

248. Patent Washing Machine; Thomas Robson, 15, Critchill-place, Hoxton, N.

249. Knife-Cleaning Machine; G. Weedon, 41, Poland-street, Oxford-street, W.

250. Opal Glass Rails, for Counting-house Desks, &c; W. Reichenbach.

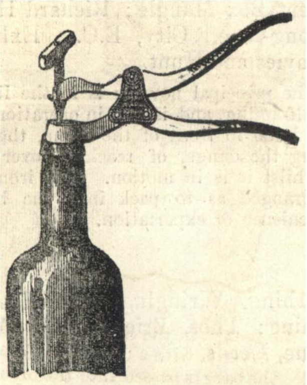
MISCELLANEA.

260. Patent Elutriator, for Decanting Wine, &c.; Charles Farrow, 18, Great Tower-street, E.C.

261. Patent Decanting Machines; Wm. Lund, Fleet-street, E.C.

262. Patent Rack Corkscrew; William Lund.

263. Patent Lever Corkscrew; William Lund.



264. Patent Spherically-jointed Pocket Corkscrew; William Lund.

265. Patent Clips for Holding Papers, Music, &c.; William Lund.

266. Fastenings for Bullion Boxes; William Lund.

267. Patent Bullion Box; Samuel Montagu.

The object of this invention is to prevent the withdrawal of the contents of the box without detection; this is effected by grooves being made near the edges of the box into which iron plates are driven. When the plates are on the box nails are driven through them, indenting the iron into the wood, and preventing the plates being forced off without so injuring them and the box as to render it impossible to replace them. The ends of the boxes are dovetailed, and spaces left between the plates, so as to prevent any attempt at sawing out the sides along the grooves.

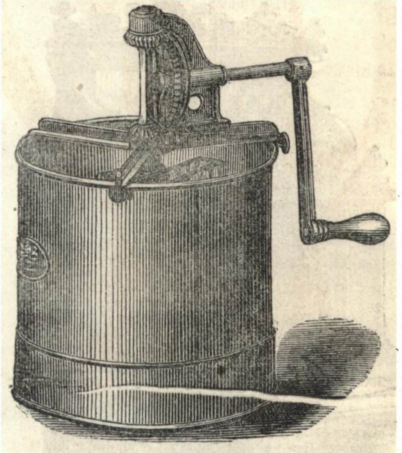
268. Patent Bread-making Machine; E. Stevens, 5, 6, and 7, Cambridge-road, London, N.E.

269. Patent Mincing Machine; S. Nye and Co., 79, Wardour-street, Soho, W.

This machine consists of a series of blades placed upon an axis, and forming an endless screw. The meat is cut and forced out of the machine by one operation.

270. Patent Compound-Action Beating, Mixing, and Churning Apparatus; E. P. Griffiths, 8, High-street, Camberwell. Manufacturer, G. Kent, 199, High Holborn, and 329, Strand, W.C.

In this apparatus two beaters are made to revolve in opposite directions by means of bevilled wheels, the axle of one beater passing through that of the other. The forks of the beaters, while rotating are made to pass through each other, thus effectually mixing the materials placed in the apparatus. It is stated to be applicable for churning, and as a whisk for purposes of confectionary.



271. Domestic Apparatus for Making Ice Creams; George Keith, Great Russell-street, Bloomsbury, W.C.

This apparatus is to be used with ice and salt only.

272. Australian Freezing Apparatus; George Keith.

This is intended for making a small quantity of dessert ice, by means of freezing mixtures, or ice and salt.

273. Domestic Coffee Roaster; George Keith.

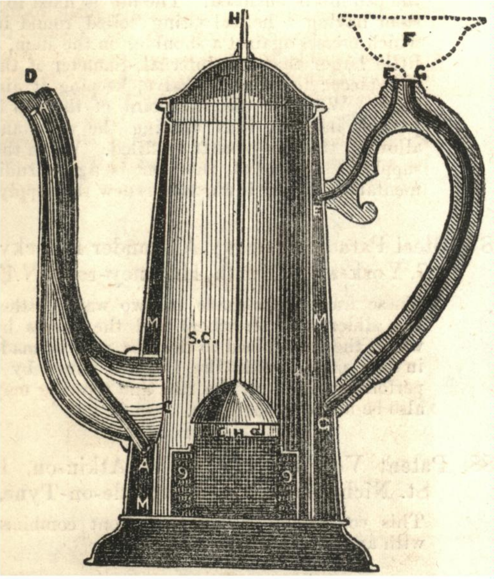
This is to be used on the top of an ordinary fire, with an arrangement for fixing it on the bars of a grate.

274. Toaster for Cooking; George Keith.

275. Patent Double Chamber Coffee Pot, for holding Milk and Coffee in separate Compartments; W. H. Myers, 202, Whitechapel-road, E.

This coffee pot is formed by a case fixed within a case, the inner one holding the coffee, the outer one the milk; at the bottom of the inner case is formed a perforated compartment to receive the holder, having a connecting rod attached to it through the top of the pot, in which holder the ground coffee is placed; inside this holder can be placed an Archimedean screw by which chocolate can be torn to pieces and agitated. The heat, instead of radiating from the sides of the pot into the air, goes into the milk, warming it previous to its being poured out. The same application is made to tea-pots, for holding milk and tea in separate compartments; and, in a modified form, for spirits and water.

FIG. 1.

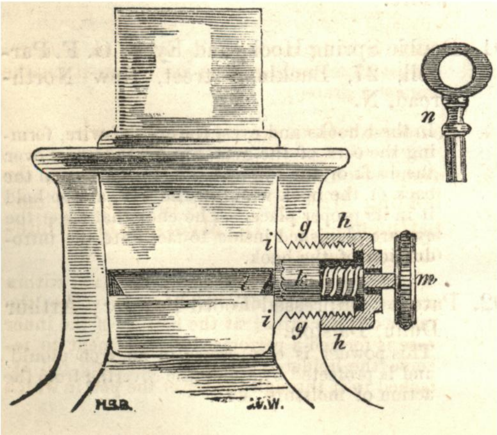


S C Inner Case for Coffee. M M Outer Case for Milk.
C H Perforated Holder or Strainer for Ground Coffee.
T The Lid which forms F the Funnel. G Milk Inlet.
AA Milk Outlets. D Coffee Outlet.
E Inlet and Outlet for Air. H Connecting Rod.
9 9 Perforated compartment for Coffee Holder.

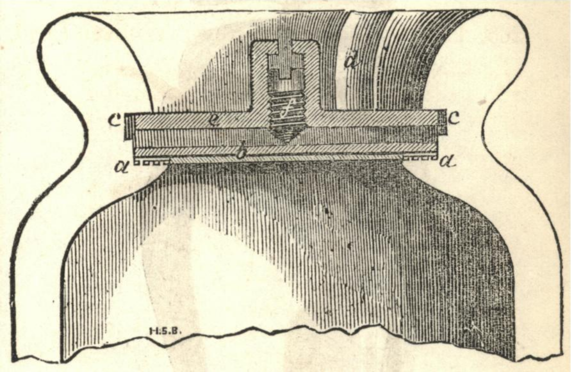
276. Improved Kettle; Taylor and Rolfe, Northill, Bedfordshire.

This kettle has a concavity at the bottom, within which are several tubes, through which the water circulates.

277. Patent Locked Poison Bottles, Locked Air-tight Jars, Spirit Bottles; Stevens and Fitch, 56, Great Queen-street, Lincoln's-inn, W.C.



The annexed woodcut shows the construction of these bottles, &c.; *k* is a bolt or plug passing through a tube *gg*, secured by a cap *hh*, with an eyelet or key-hole; *m* a moveable key that screws on the bolt *k;* this bolt being pointed to lodge in grove *l* in stopper *ii*, by pulling the key in an outward direction, it forces back the coiled spring on bolt *k*, and allows the stopper to be removed; placing the stoppers in the bottles forces the spring back and locks itself; the key being unscrewed, the contents of the bottle are secure. As merely placing the stopper in the bottle causes it to lock, it is evident the spring must be drawn back every time the bottle is used.



In the mouth of the jar, the ledge *aa* receives a lid or cover *b*, with a layer of cork on the underside; the bar *e* is passed into the mouth of the jar by means of the slot or opening *d;* when turned onwards to the groove *cc*, it is in its place. The screw *f* is worked up or down by means of a key passing through a key-hole on the top of the bar and fitting to the screw; screwing down forces the cover *b*, and imbeds the cork on the ledge *aa*. Working the screw up, relieves the bar, and it may be moved round to slot *d*, and taken out.

278. Patent Cornucopian Feeder; Henry Edwards, 1, Bishopsgate-street Within, E.C.

This invention is intended for administering food or medicine to the sick or to children. It is also applicable for giving medicine to cattle. A patent air stopper is adapted to it, which regulates the flow of liquid.

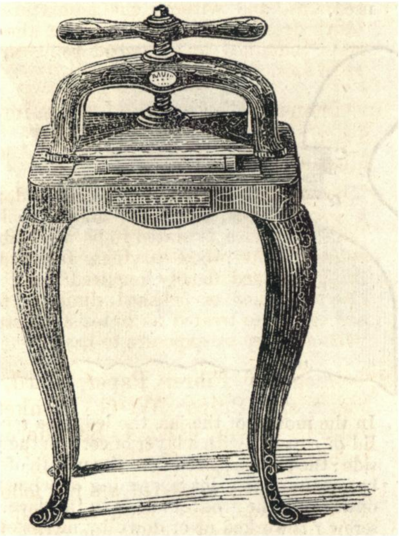
279. Patent Arabica (Lentilised) Cocoa; Samuel Riley, Stamp Office, Oldham.

This article is mixed with lentils in lieu of the flour of wheat, rice, sago, tapioca, and arrowroot, the ordinary ingredients of the best commercial cocoas. Its chief property consists in its possessing a large amount of albuminous matter in proportion to that of oily matters.

280. Postage Stamp Distributor; S. Denham, Wakefield. Exhibited by Thos. G. Iveson, 60, St. Peter's-road, Mile End, E.

This instrument is intended for the delivery of postage or other stamps singly to purchasers, so as to dispense with the attendance of an official for this purpose at post and receiving offices. One penny being put into the hole near the top, unlocks the instrument, and allows the handle on the left to be pulled out; this, on being pushed in, sets in motion two rollers, through which a string of stamps passes from a supply roller, forcing out one to be pulled off. One stamp only can be had at a time, and halfpence or smaller coins are rejected.

281. Patent Letter Copying Press; William Muir and Co., Britannia Works, Manchester.



In this press the stand and press are made in one piece, so that the complete machine can be made at less cost than hitherto. This arrangement is found advantageous for exportation, as no timber is used. The legs can be easily taken off, so that it may be packed in a small compass.

282. Patent Ready Index Ledger; J. Raven and Co., 46, Fish-street-hill, E.C.

283. Patent Pocket Watch Fastener; Robert Mair, Edinburgh.

This consists of two segments of thin steel, fitting round the periphery of the watch, and intended to be worn in the pocket. There is an arrangement of hinges and a catch, by which the watch may be released when required.

284. Patent Lock for Brooches: John Long, Tiverton.

In this arrangement a spring catch passes over the end of the brooch pin, and must be drawn back by the finger in order to unfasten it.

285. Osmont's Patent Pocket Reservoir Penholder. Exhibited by E. Stevens, 5, 6, and 7, Cambridge-road, N.E.

The penholder in this case becomes the reservoir for the ink. Within the holder is a double threaded screw upon which a piston works. By turning this screw so as to draw the piston up the holder, the reservoir is charged with ink, which is supplied to the pen as required by turning the screw and driving down the piston.

286. Fountain Pen; J. Needham.

This pen-holder consists of a tube, having a cap, which, when screwed on, is ink-tight. At the opposite end is a conical nose-piece, in which the pen nib is enclosed. The nib is fixed to a stem having a helical spring coiled round it, which presses against a shoulder on the stem, a little larger than the internal diameter of the nose piece; this forms a valve, keeping it air-tight. When in use, the point of the pen is pressed inwards, thus opening the valve and allowing the nose-piece to be filled. When the supply is exhausted, the pen is again rudimentarily pressed inwards to renew the supply.

287. Steel Parasol Frames; Alexander Porecky, 7, York-street North, Hackney-road, N.E.

These frames are made in two ways; either the slider and stretchers and the pivots by which they are joined to the ribs, may be made in one piece, while the ribs are joined by a perforated ring; or, the ribs and top-ring may also be made in one piece.

288. Patent Vest Shirt; Robert Atkinson, 1, St. Nicholas-square, Newcastle-on-Tyne.

This consists of a waistcoat-front combined with an ordinary shirt.

289. Patent Lignite; D. J. Walton & Sons, Haughton Dale Works, Denton, near Manchester.

This composition is a combination of resins and fibrous substances, and is remarkable for hardness, polish, and durability. It is applicable for various purposes, amongst which may be named furniture fittings. The polish is natural, no surface layer of polish being applied; it is also perfectly waterproof when laid on wood, cloth, &c. Specimens of various articles made of this material are exhibited.

290. Patent Method of Wrapping Needles; Richard Bennett, Redditch, Worcestershire.

291. Double Spring Hooks and Eyes; G. F. Parnell, 27, Buckland-street, New North-road, N.

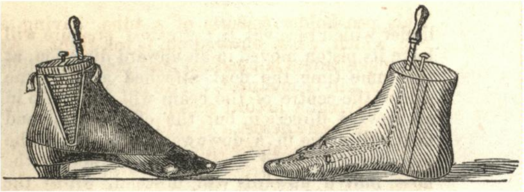
In these hooks and eyes, the ends of wire, forming the ears of the eyes, are made to pass over the back of the eye and act as springs on the back of the hook when in the eye, and so hold it in its proper place. The ends that cover the eye are planished inside to facilitate the introduction of the hook.

292. Patent Compressed Tooth Powder; Arthur Dunn, Dalston.

This powder is compressed in an iron mould, and is protected by a metallic covering from the action of moisture, &c.

293. Bowler's Mechanical Boot Stretcher; J. Sparkes Hall, 308, Regent-street, W.

This is an arrangement for stretching a boot at several distinct points, as shown in the annexed woodcut. The bosses by which the stretching is effected are forced outwards by a screw acting in the interior of the last.



294. Patent Brown Enamelled Leather Boots; Bowley and Co., Charing Cross, W.C.

These boots are specially intended for use in hot climates.

295. Patent Self-supporting Stocking; Frederick Ayckbourn, 4, Lyon's-inn, Strand, W.C.

For these stockings the garter, which is in the first place made separately and expressly for the purpose, is afterwards incorporated into the stocking in the process of manufacture.

296. Patent Swimming Propellers; John Cox, Edinburgh.

This propellor is to be attached to the leg, and acts upon the principle of the webbed feet of aquatic birds, collapsing when drawn up, and expanding when pushed against the water.

297. Double-Revolving Electro-Plated Fish-Hook; W. H. Box, M.D. Exhibited by Thomas Hemming and Son, Victoria-place, Redditch, Worcestershire.

The peculiarity of this hook consists in the application of a double swivel to the box to which the hook is directly attached by means of a knob, or pin-like head, so that it turns round without slipping through the box, while the upper part is completed by the usual round eye, or one of an elongated figure fitted with a spring, which, thus combined, allow the hook to make a double revolving action. It is also electro-plated with silver, and its appearance is rendered so attractive in the water, that it has been found to take certain fish without being baited. The hook is also supplied with a nuzzle of brass wire, of thirteen or fourteen inches in length, on the top of which is another swivel like the former, with a round eye for attaching the line, and with its lower end turned up in the shape of a noose, by which means it may be slipped off or on to the hook with perfect ease.

298. Parchment Address-band for Carpet Bags; W. H. Merle, 20, Princes-terrace, Hyde-park, S.W.

On the card-plate or frame, either of brass or leather, the permanent address is written. At each end of this, and under the frame which holds the card, are two openings, through which a slip of parchment is passed, upon which any number of addresses may be written, and by drawing along the band these may be shown as required.

299. Patent Fibre obtained from Wood, and Paper made from it; J. C. Martin, Fern-cottage, Charlewood-road, Putney, S.W.

This fibre is manufactured from short or waste ends of wood. The three varieties of paper exhibited are made wholly from the fibre without the removal of the short pieces which it contains, and without the admixture of any other description of pulp or size, the natural resin contained in the wood being so treated as to form size.

300. Specimens of Plastic Wood, or an improved description of Papier Maché; J. C. Martin.

The specimens shown are an inkstand, a mask, a corner piece, a bracket, and a book cover. This substance is stated to be applicable as a substitute for wood carvings, as it admits of being moulded to any required form. It can also be worked or polished similarly to wood, and can be so treated as to resist moisture. It will not warp by exposure to heat.

301. Specimens of Fibre, Paper, Card, Millboard, and Pulps; W. G. Plunkett, and John C. Bower, C.E., 4, Belvidere-place, Dublin.

The specimens exhibited are the following—1, Handmade paper, card, and pulp of the "Iris pseud acorus" or common yellow flagger; 2, Washed fibre of the "Lavatera Arborea" or tree mallow; 3, Hackled hemp from do.; 4, Pulp of fibre or hemp; 5, Card and boards made from the wood of the "Lavatera Arborea;" 6, Millboard, from the small branches of the "Lavatera Arborea;" 7, Card from fibre of Lavatera Arborea; 8, Boiled and "washed fibre of the Bine" of the "Humulus Lupulus," or common hop plant; 9, Pulp made from do.; 10, Paper, card, and board from do.; 11, Pulp, paper, card, and board, made from the "Trifolium Rubens," or red clover; 12, Fibre of the "Iris pseud acorus," or yellow flagger. The foregoing unsized specimens have all been handmade. The "Iris pseud acorus," or common yellow flagger, is indigenous to Great Britain and Ireland. It produces, from the dried plant, from 60 to 70 per cent. of a strong fibre, (No. 12.) The "Lavatera Arborea," or sea tree mallow, produces a large quantity of fibrous matter, and, if properly cultivated, might, in the opinion of the exhibitor, be the means of turning the vast tracts of bog and waste lands in Ireland to a valuable account.

302. Improved Paper File; J. Faulkner, 62, St. Martin's-le-Grand, W.C.

This file is to be screwed against a desk or partition. The improvement consists in the addition of the upper horizontal guard of brass, for the prevention of accidents.

303. Patent Glass Birdcage; F. Ayckbourn, 4, Lyons Inn, Strand, W.C.

DRAWINGS.

310. Patent Syphon Smokeless Air Furnace; Major Vandeleur, R.A., Royal Arsenal, Woolwich, S.E.

The fireplace of this furnace in its longitudinal section much resembles an inverted syphon. The coal is thrown on at one end of the syphon, and the flame drawn out at the other. Two currents of air are made to pass diagonally through the fire, and uniting at the lower point of the arch, form an intense and perfectly smokeless flame.—(See *The Times*, March 2nd, 1858.)

311. Patent Conical Flue, and Double Chimney Steam Boiler; R. Morrison, Ouseburn Engine Works, Newcastle. Exhibited by W. and J. H. Johnson, 47, Lincoln's-inn-fields, W.C.

312. Improvements in the Generation of Steam, &c.; George Scott, Philadelphia, U.S.

This invention consists in injecting into a heated metallic vessel atmospheric air and water commingled, the water in the form of spray. This is stated to produce a greater amount of mechanical power with a given quantity of fuel than steam generated from water alone.

313. Slide Valve.; Charles Botten and Son, Crawford Passage, Clerkenwell, E.C.

See Model, No. 20.

314. Patent Indicator for Registering Pressure; Thomas Baldwin, Corn Market Buildings, Bury, Lancashire.

By this instrument (Figs. 1 and 2) the force exerted by a steam engine, may be ascertained, whether the engine has a constant or variable velocity, or a constant or variable pressure acting on the piston. The action of the governor of the indicator upon the measuring apparatus is such as to cause it to measure a pressure proportionally *greater* when the velocity increases, and proportionally *less* when the velocity decreases, than the true pressure which is measured when the velocity is constant. The sum of these pressures being multiplied by the constant velocity (the velocity at which the instrument measures true pressure) will give the force exerted by the engine during the time it has been in motion. The shaft T is connected to the registering apparatus for mean pressure, and the shaft O to that for indicating the revolutions. The dotted lines show the position taken by the instrument when the pistons move up or down. Figs. 3 and 4 represent an instrument for registering pressure without the use of springs. When the steam from the engine enters the cylinders of the instrument, the cylinder which receives the greatest pressure will have its piston moved in an upward direction, at the same time the float attached at the same side of the centre of the beam will move also in an upward direction, but the other piston and float will move in a downward direction. The mercury contained in the vessel wherein the float moved upwards will descend, whilst the mercury contained in the other vessel will ascend; and the column of mercury above the bottom of the descending float will be greater than the column above the ascending float; and the difference between the height of the two columns multiplied by the area of the bottom of the float C, and by the distance of the centre of the cylinder from the centre of the beam, will be always equal to the difference of the pressures acting in the cylinders, multiplied by the area of the piston A, and by the distance of the centre of the float on the other side of the beam centre. If the greater pressure be put into the other cylinder the operation will be reversed. The last-named instrument may have the measuring apparatus of Figs. 1 and 2 attached. Each instrument is adapted to take diagrams from the cylinder of the engine.

315. Patent Speed Regulator; Biggart and Loudon, Dalry, Ayrshire. Exhibited by W. and J. H. Johnson.

316. Mercurial Alarum Steam Pressure Guage; J. G. Jones, 2, King's-parade, Chelsea, S.W.

This invention consists in so constructing mercurial steam pressure guages that they shall give an alarm at any desired pressure; and in preventing the waste of mercury by its being blown out of the tube by any sudden increase of pressure in the boiler, as is often the case with the guage now in use; and also in preventing water accumulating on the surface of the mercury, which gives a false indication. The drawing shows the manner in which this is accomplished. Figure 1 is a longitudinal section. A is a bent tube (the same as that composing the common guage), which is bolted to the boiler at A^1. The tube (A) communicates with a vessel or receiver (B) by means of a branch pipe (B^1), on to which the graduated scale (C) is screwed, closing its end, and thus preventing any water getting into the tube (A). It will be seen that, should the pressure of steam in the boiler exceed the weight of the column of mercury in the tube (A), the mercury will be forced out of the tube into the vessel or receiver (B), leaving a free passage for the steam from the boiler to the whistle (D), as shown in Figure 2, which will give an alarm, calling the attention of the engineer to the state of the boiler. The instrument can be readily re-adjusted, by opening the cock (E), and allowing the mercury to flow back into the tube (A).

317. Patent Fluid Pressure Regulator; Guest and Chrimes, Rotherham. Exhibited by W. and J. H. Johnson.

318. Patent Steam Engine; Thomas Moy, 1, Clifford's-inn, E.C.

In this engine, the boiler is of tubes of small diameter, and consequently of great strength. The water is pumped into the tubes, and the heat applied externally. The heated water is kept in constant circulation on the well-known Perkins' system. No steam is allowed to form in the boiler, the pressure being kept so as to prevent the formation of steam in the boiler, at whatever temperature it may happen to be working. The cylinder is furnished with a jacket, in which the water circulates, and this jacket, as well as the valve box, is always in communication with the boiler, the circulation being uninterrupted, whether the engine is at work or at rest. The valves are so formed that the attendant can regulate the power of the engine at pleasure. The valves measure off and deliver to the cylinder, each time they are reversed, a certain quantity of highly-heated water, which will turn into steam, partially upon its entry, and partially after it has entered the cylinder. It is well-known that the sensible heat and the latent heat of steam, at any pressure, being added together, amount to 1,212°; therefore, the higher the sensible heat, the smaller is the quantity of latent heat. Suppose, then, a certain portion of water to be delivered to the cylinder, at the commencement of the stroke, at 1,000°, almost all this water will become steam of very great pressure; no more water being allowed to enter, this steam will drive the piston with a constantly diminishing force. But the remaining quantity of water will require to be turned into steam before the end of the stroke. This will be accomplished by the heated jacket of the cylinder, because, in consequence of the continued expansion of the steam, the heat of the jacket will be far higher than the attenuated steam would require, and the whole of the water becomes steam before the completion of the stroke of the piston. The steam, after having performed its work in the cylinder, passes into a surface condenser, to be re-converted into water, and pumped back into the boiler. A self-acting apparatus keeps the boiler always properly filled with water.—(See the *Mechanics' Magazine*, Feb. 6, 1858.)

319. Patent Steam Engine Blower Pump and Meter; Robert Barclay, Montrose.

Steam enters by the sliding abutment C (Fig. 1), which is divided into two compartments, and is conveyed, through a slot in its upper side, into the working chamber formed betwixt the outside fixed cylinder A, and the uppermost side of the rolling cylindrical piston B. The exhaust steam escapes by a slot in the lower side of C. A (Figs. 1 and 2) is a fixed metal cylinder truly turned inside, resting on the metal platform K. B (Figs. 1 and 2) is a metal cylinder, truly turned outside, and on the projections on the inside; it is free to roll around the inside of the fixed cylinder A. The plain rollers D, D^1, and D^2, roll upon the projecting parts inside B, and being keyed upon the main shaft F by the bracket E, (Fig. 1), they keep the rolling piston B tight against the fixed cylinder throughout the revolution. D is a double roller (Fig. 3). D^1 receives the pressure of the steam, and communicates the power to the main shaft, causing it to revolve. D^2 steadies and reverses. The end covers, H and H^1, (Fig 2) are required to complete the steam working chamber. H^1 is adjusted in its pressure upon the end of the rolling piston by sets of screws in pairs, working on the circular piece J; one screw of a pair pinches the cover down while the other draws it up, thus the most perfect freedom of movement consistent with steam tightness is attained for the rolling piston. The sliding abutment C, which divides the fresh from the exhaust steam, is kept tight against the side of the rolling piston B, by steam having access to the small chamber on its head. F, the main shaft, runs in bearers on the metal platform. As a blower pump or meter the mechanism is greatly simplified. The movement of this engine is perfectly smooth, the whole mass moving in one direction. A rubbing point on the end of the rolling piston makes a very short travel, about 13 inches per revolution, as compared with about 50 inches in an ordinary reciprocating engine of same power. It can be so arranged that a rubbing point shall not pass over the same line in many thousand revolutions; unequal wear of the rubbing surfaces is thus saved. Friction is reduced to the minimum by adjustment of the end cover. A very high speed can be attained without the loss of power attendant on a heavy reciprocating body moving at a great velocity. Two of these engines bolted together, actuating the same shaft, are said to give out precisely the same power at every point of the revolution.

320. Patent India-rubber Accumulators, as applied to Boring Rods; R. E. Hodges, 44, Southampton-row, Russell-square, W.C.

The drawing shows a "compound accumulator," composed of 60 "simple" accumulators, held together by a pair of shackles. Each of the 60 is ¾-inch diameter, 18 inches long, and equal to 56lbs. when stretched to 7½ feet. Any portion of the 60 accumulators can be used in the shackles, to suit the weight of the rod, but when the whole 60 are attached, the power of four men will work a rod of 30 cwt. through an 8-inch stroke. They are also useful for a cable and towing spring, and for driving machinery, &c., &c.

321. Morris's Patent Improvements in Joining, Securing, and Supporting the Rails of Railways. Exhibited by F. W. Campin, 156, Strand, W.C.

The arrangements shown by the drawing exhibited consist of what the inventor terms "high-backed chairs," on which the rails are secured. In the two arrangements shown at the foot of the drawing, the securing the rail to the chair is effected by screws passing through the "high back" or ridge of the chair, the rail, a side-plate, and nut, a key or wedge in the lower part of the chair being added for ensuring a firmer joint. In the arrangements shown by the figure at the top of the drawing, although the chair is a "high-backed one," somewhat similar to the others, it has no screws or nuts for securing the rail in the chair, the plan here adopted being to bring two ends of rails together in the chair, and to drive up tightly the peculiar-shaped key or wedge shown.

322. Patent Railway Chair; R. J. Badge, Manchester.

See Model, No. 43.

323. Railway Crossings; Irlam and Bethell, Gibraltar Iron Works, Manchester.

The crossing is constructed of a compound cast-iron chair, that portion of the wing rail upon which the rails can never run being cast to the same. Those parts which are subject to all the wear and tear are square bars of iron, steeled on the surface, and being short pieces inserted firmly in the chair, offer great facilities for steeling. These pieces, when worn down, are easily taken out, and at a small cost re-steeled

324. Railway Turntable; Irlam and Bethell.

This invention consists, first, in making the outer or guard of wrought-iron plates, instead of cast-iron; secondly, in rivetting or otherwise attaching chairs to such guard, to support the annular rail for the turntable to revolve upon, or in attaching the rail to the guard by other means; thirdly, in making the platform or revolving part of the turntable of an outer ring, connected by wrought-iron girders, which girders support the chairs for the cross rails.—(See the *Engineer*, 21st August, 1857.)

325. Railway Turntable; Irlam and Bethell.

This turntable is constructed principally of wrought-iron, and when not required to be turned rests on a solid bearing, immediately under the line of rails on which the trains run; and when required to be turned, the centre is raised by a few turns of the handle, so that the weight is supported by the centre pin; this is steeled and hardened, so that the friction in turning a heavy weight is very slight. By turning the handle the contrary way, the centre is lowered, and the table rests upon its solid bearing, and is then as firm and steady as the permanent way.

326. Patent Railway Turntable; Thos. Richardson and Sons, Hartlepool Iron Works, Durham. Exhibited by W. and J. H. Johnson.

327. Patent Railway Brake; J. Sutherland.
See Model, No. 63.

328. Patent Bedplate Iron Solid Sleeper Permanent Way; Thos. Wright.
See Model, No. 50.

329. Lighthouse and Sea-coast Mariners' Refuge; J. S. Morris, 8, Earl-street, City, E.C.

The foundation of this building is proposed to be of wrought-iron piles, the superstructure being in the form of a cone, formed of wrought-iron bars, crossing each other diagonally, and forming a trelliced conical structure of great strength, and offering but little resistance to the waves. The dwelling and light apparatus is cylindrical, and suspended in the frustum of the cone in such a manner as to retain its perpendicular position, under an alteration of that of the cone to the extent of 15 degrees.

330. Bell Buoy; George Chowen, Marystowe, near Launceston.

This buoy is so constructed as to be susceptible of the slightest motion of the waves, and in rough weather the bell will be continually ringing. The inventor proposes that buoys of this construction should be placed near the Goodwin Sands for the prevention of casualties.

331. Straight-timbered Ship, with Diagonal Planking; T. S. Henzell, Howdon-on-Tyne.

In this arrangement the timbers are almost entirely straight, with diagonal planking of the whole height of the vessel. This is stated to afford increased strength.

332. Patent Iron Masts; Finch and Lamport.

See Model, No. 116.

333. Patent Perforated Paddle-wheel Floats; H. D. Deane, 18, Pigot-street, East India-road, Limehouse, E.

See Model, No. 113.

334. Adjutant Helm; Colonel Daniell, Donington-park, near Derby. Exhibited by John Gedge, 4, Wellington-street South, Strand, W.C.

This invention affords a means of communication from the bow of a vessel with the steersman at the helm. The apparatus consists of an upright revolving shaft at bow and stern, connected by an endless chain. The index on the bow dial being set to a given point of the compass, the same point is unerringly and instantaneously indicated on the stern dial, and the steersman changes the course of the vessel to the given point.

335. Patent Windlass; G. D. Davis.

See Model, No. 122.

336. Patent Ships' Capstan; W. Cunard, Halifax, Nova Scotia. Exhibited by W. and J. H. Johnson.

337. Improvements in Chains for Cables; E. Edwards, Abenbury Forge, Wrexham.

In this chain the links are formed so that the pile or fibre of the iron will run longtitudinally round every link so as to obtain uniform strength throughout. To insure this it is proposed to roll the bars of iron oval or slightly flattened on both sides, so as to indicate the top and bottom of the pile of iron. A strong spring stud is used, which is lighter than the solid stud, and has the advantage of giving the chain considerable elasticity.

338. Patent Military Tents; Capt. G. Rhodes.

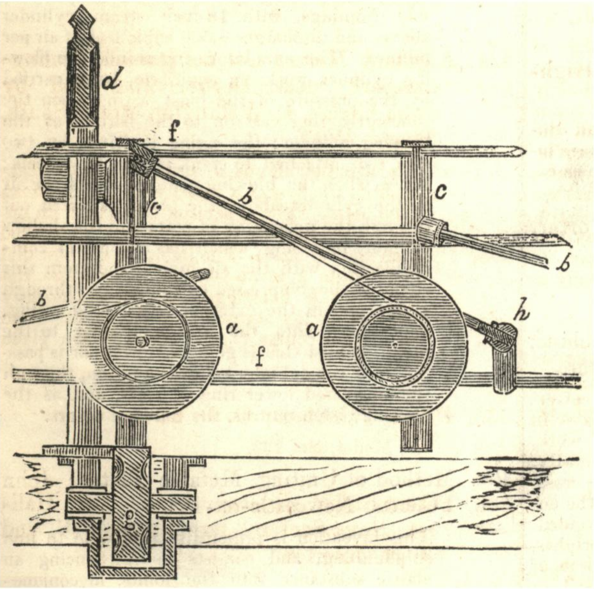
See Model, No. 136.

339. Improvements in Founding Submarine Works; J. R. Winder, Admiralty Pier Works, Dover.

340. Patent Rope Machine; Archibald Smith.

The peculiarity of this patent consists in the angular position of the frames containing the reels, by which means much useless friction on the wire is avoided, by its being brought directly to the periphery of the revolving frame, and the length of the machine considerably reduced. Fig. 4 is a longitudinal section of one reel frame, &c.—A, reel; B, frame; C, ring or disc; D, guard frame; *f*, tubular distance pieces between each ring or frame; G, roller supporting ring C; *h*, bearing for end of frame *b*. The wires or strands pass from A through hollow ends of frame *b*, and ring C, and through holes in each ring till it reaches the foremost one, thence to the laying plate, as in the machine above described. The bobbins being hung below the centre of their frames, are prevented from being carried around by the revolution of the frame. (See Model No. 104.)

Fig. 4.



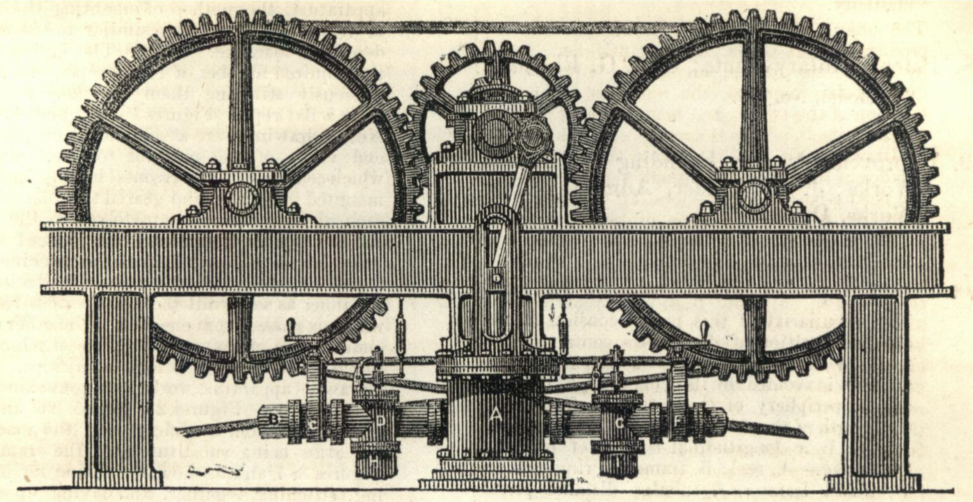
341. Patent Rope Machine; Archibald Smith.

This invention relates to the manufacture of flat wire ropes, and is divided into three distinct operations. 1stly. The manufacture of a right and a left-hand strand or rope by one machine. This is accomplished by the machine. Figures 1 and 2 having in each compartment two reels, the wires or strands from one set being led towards one end, and those from the other set towards the other end; also by having a laying plate, &c., at each end, and a double draw-off apparatust, the method of mounting the frame or friction rollers being similar to the above-described machine. 2ndly. The laying up of the required number of round ropes, and simultaneously stitching them together, so as to form a flat rope. Figures 1, 2, 3 and 4, sheet No. 2 (drawing), are a side elevation plan and end views of the machine for that purpose, which consists of six horizontal laying machines, mounted in frames, and geared together, so that each alternate machine revolves to the right and left hand. The strand being placed on the reels, F. G. H, are led from the machine to a frame, *m*, where they are spread asunder in such a manner as so permit the passage of a reel, Q, which is passed from one side to the other every quarter turn of the machine, thus stitching the round ropes together to form a flat rope. X is a draw-off apparatus, working in connexion with the machine. Figures 23, 24, 25, 26, and 27, represent another modification of the machine, the arms being substituted for the frame, *m*. Figures 3, 7 and 9, show a machine for unlaying, stitching together, and laying up round ropes previously made. The round ropes are wound in reels, and the ends opened and passed through the frame, *m*, as in figures 1 and 2, the stitching and drawing-off apparatus being similar. (See Model No. 104.)

342. Improvements in Apparatus for Paying-out and Drawing-in Electric Telegraph Cables; Benjamin Beale, 7, Lambton-terrace, East Greenwich., S.E.

The improvements consist of an arrangement of machinery that will act as the retarding apparatus, when paying out the cable, by forcing or drawing, or by forcing and drawing air, gas, water, or any other fluid, which apparatus will act as the motive power engine for hauling in the cable, when the pressure of steam, air, gas, water, or any other fluid is applied for such purpose. The woodcut represents a front elevation of a machine constructed with two pairs of grooved pulleys, having the cable wound round them. A is a cylinder, fitted with a metallic piston and a slide valve, the latter wrought by an eccentric, similar to a full pressure non-condensing steam-engine. Three of these engines are preferred in connexion with the same crank shaft, with the cranks set at equal angles with each other, to insure steadiness of action. B is an inlet pipe, in connection with a small air vessel at H, and, in common with the three cylinders, fitted with a stop valve C, and vacuum valve D, having a lever and a Salter's spring balance attached. E is an outlet pipe, in connection with a small air-vessel at I, and in common with the three cylinders, having a stop valve F, and escape-valve G, also fitted with a lever and a Salter's spring-balance; this outlet pipe is connected with a suitable boiler, which is to supply steam when the apparatus has to be used for hauling in the cable. The motion of the machine is given by the running out of the cable, which turns the wheels with the shafts and cranks, which, through the intervention of the connecting and piston rods, give a reciprocating motion to the pistons, drawing air (the stop valves being closed) into the vacuum valve

D, and forcing it out through the escape valve G. If the vacuum and escape valves be open, the strain on the cable will be but little more than that due to the friction of the machine.



343. Apparatus for Paying-out Submarine Telegraph Cables; L. Gisborne and H. C. Forde.

See Model, No. 106.

344. Buenos Ayres Gas-works Retorts (W. Bragge); E. T. Belhouse and Co., Manchester. Exhibited by W. and J. H. Johnson.

345. Patent Gas Top; W. Oakes, 115, High-street, Stockton-on-Tees.

In this invention the gas is collected and conveyed away from the centre of the furnace instead of from the side, as is ordinarily the case.

346. National Gas Apparatus; J. T. B. Porter, Lincoln.

See Model, No. 80.

347. Patent Reciprocating Drilling Machine; Batho and Bauer, Salford, Manchester.

This machine is intended for drilling cotter-holes in connecting rod ends, key-ways in shafts, and a variety of similar kinds of work, as well as for drilling and boring generally. The spindle being so near the face of the cross-slide, great steadiness is obtained, and the enlargement of the ends of the slots is avoided. The space being clear between the uprights, large objects can be admitted. The table is of the telescopic form, and is easily raised or lowered, and has a transverse slide at right angles to the cross-slide; it can be removed altogether out of the way for large work to be fixed on the baseplate. The working parts are readily adjusted, being easy of access.

348. Patent Moving Cylinder 6½-ton Steam-Hammer; John Condy, Gowan Bar Iron Works, Glasgow. Exhibited by W. and J. H. Johnson.

This hammer is designed for forgings of the largest class.

349. Patent Blowing Engine; Edwin F. Jones, Redcar.

A 50-inch blowing cylinder is placed upon two side framings, with 18-inch steam cylinder above, and discharges 6,500 cubic feet of air per minute. The annular casing around the blowing cylinder works in equilibrio, being carried by the pressure of the blast acting upon the concentric ring cast on to the bottom of the blowing cylinder; the casing is driven by two side rods attached to crank pins in fly-wheels; hence, when the blowing piston ascends, the air in the cylinder above the piston is forced out through the upper ring of ports into the shallow chamber of casing (which has a constant communication with the air main), and from this chamber the compressed current escapes through a side port in the external face of the casing, and thence into the branch leading to the main. Whilst this is going on, fresh air is passing into the cylinder below the piston, through the uncovered lower ring of ports, and as the blowing piston returns, the converse occurs.

350. Method of Uniting Metallic Plates; John Coutts, Newcastle-on-Tyne.

This invention is principally applicable to iron shipbuilding, and consists in introducing an elastic substance into the joints, in conjunction with a peculiarly formed bolt and nut, the nut having a concavity on its face for receiving an elastic ring, and the bolt, a recess in its head, by which it can be turned.

351. Patent Winding Machine; Robertson and Orchar, Wallace Foundry, Dundee.—Exhibited by W. and J. H. Johnson.

352. Modification of the Jacquard Loom; Alfred Barlow, 10, Wellington-place, Blackfriars-road, S.E.

The object of the present modification is to produce various twills, figured, designed, &c., by self-acting means, an outline only of the design being required, the repetition and combination of the twills, &c., being effected by the machine itself. This is accomplished, as shown in Drawing No. 1, by passing the horizontal needles of the Jacquard through vertical slots in the needle-board, and perforating the cylinder with two or more varieties of twills, &c., so placed on the surface of the cylinder that when the horizontal needles remain at the bottom of the slots they will be acted on by one variety of twill or satin only, but if all or any portion of the needles be raised in the slots, then they will be acted upon by any other variety of twill, &c., opposite to which they may be placed. The design is cut out of leather or other material of requisite thickness, and tacked to the surface of the pattern cylinder as shown. This cylinder is placed immediately under a set of vertical needles, through the eyes of which the horizontal needles are passed. When the pattern cylinder is raised, the design on its surface will raise the vertical needles above it, consequently one portion of the horizontal needles will be acted upon by one variety of twill, &c., and the other portion by another variety, and as the cylinder revolves slowly after each action upon the needles, the whole surface of the design will be acted upon in succession. Drawing No. 2 shows a section of an ordinary Jacquard power loom, to which the above system has been successfully adapted. By regulating the speed of the pattern cylinder, the design may be woven in any given "count" or relative proportion of warp and weft. The pattern cylinder shown (full size) is equal in extent to 450 cards, and the relative cost will be apparent from the two modes of producing the same design, as shown on Drawing, No. 1.

353. Patent Check Loom; M. A. Muir and J. McIlwham, Anderston Foundry, Glasgow. Exhibited by W. and J. H. Johnson.

354. Patent Dust Exhauster; C. Nightingale, Wardour-street, W.

This drawing exhibits the dust exhauster as applied to a rag breaker. It consists of a hollow gauze cylinder (from the centre of which the dust is exhausted) revolving over a delivery cloth. The objects which it effects are the removal of the dust, both from the rags broken and the breaker room.

355. Patent Machine for Glazing Paper continuously in the web or length; J. C. Martin, Fern-cottage, Charlewood-road, Putney, S.W.

This apparatus consists of a pair of metal cylinders or endless plates fitted loosely over ordinary glazing rollers, and which revolve with the motion of the rollers against each other, always presenting a continuous glazing surface to the paper as it passes between them. This arrangement of the glazing plates admits of the rollers being heated by steam, and the paper glazed of any required length. To prevent the creasing, a plate of metal lined with leather is fixed over about two-thirds of the circumference of the upper glazing plate, and over this the paper is drawn by the motion of the rollers before passing between the plates. The paper as it passes over the fixed plate is covered with a sheet of canvass. The object of this is to present a large fixed or resisting surface to the paper as it passes over the roller, immediately before receiving pressure.

356. Patent Brick-making Machine; R. Grey, Newcastle-on-Tyne. Exhibited by W. and J. H. Johnson.

357. Plan for Constructing and Arranging Roads and Ways for relieving the Traffic of London; Charles Baylis, 32, Poultry, E.C.

358. Machinery for the Cultivation of Land by Steam-power; Thomas Keddy, Handsworth, Staffordshire.

This drawing is to the scale of one inch to the foot. Fig. 1 is a side elevation of the machine; and its chief features are—1. A spring *a* over the guide wheel *b*, so that an equal pressure may be given notwithstanding inequalities of the soil. 2. An endless metallic platform, *c d*, extending the whole breadth beneath the boiler, presenting a surface to the earth of upwards of thirty superficial feet. There are large fluted rollers, *e f*, over which the platform *c d* moves, and small rollers, *g h*, press upon the platform, which give an equal bearing to that portion immediately in contact with the ground; it has a broad wheel, *i*, on each side, upon which, and the guide wheel *b*, the whole weight of the machinery can be raised by hydraulic or other power, and geared for turning upon new ground at the land's ends. 3. Vertical rotatory screws, or tillers, *k*, follow in a line, at right angles to the line of draught, and may be raised or lowered to any required depth. 4. An oscillating or zigzag harrow follows. There is a plate of iron, *l*, to which is fixed a number of prongs, *m*, and by drawing a lever these prongs pass through the fixed plate *n*, and are perfectly scraped. Curved prongs, *o*, collect the weeds or twitch, which may be deposited at pleasure by drawing forward the lever *p*. Fig. 2 is an end elevation of *k* in Fig. 1. Fig. 3 is a plan of *l n*, Fig. 1.

359. Archimedean Cultivator; J. James Cousins, Leeds.

This is an arrangement for working a cutter formed like an Archimedean screw, in advance of the ploughshare.

360. Patent Centrifugal Corn Dryer; J. C. Sinclair, Elgin.

In this apparatus the grain is deposited in a revolving chamber in such a manner that the stubble ends are next to the outside of the arms, whilst the tops or corn ends overlap each other so far in the middle as to keep the layers tolerably level, the damper samples being disposed at the parts nearest the extremities. When steam is at hand, a jet can be conveyed into a perforated chamber in the centre of the apparatus, to aid in drying the grain as well by the direct steam heat as by the aerial current, which may thus be produced in contact with the grain. The aerial current can be rendered drier by causing it to flow over layers of muriate of lime, or other matter having a powerful affinity for moisture. By these means, and by using waterproof covers to protect the grain in transit from the drying machine to the stack-yard, and a temporary stage or canopy over the " steddle," stack building may safely proceed in the wettest weather.

361. Patent Hot Air Stove; Edwin F. Jones, Redcar.

In this stove the flame or gas passes (as shown in the Drawing) in the direction of the arrows, first through the holes in the arch above the fire-grate, into the body of the oven. After heating the external pipes the heat passes through the internal pipes of the top tier, thence down the flue, through the bottom tier, into the chimney. The air to be heated enters as the inlet divides in the cross main (see Plan), and passes between the internal and external longitudinal mains down the vertical branch, and likewise back through the bottom tier into the outlet, perfectly heated to the blast furnace. The advantages are stated to be — 1st. Double-heating surface, with half the weight of iron. 2ndly. Heating the air in strata. 3rdly. A saving of positive power, owing to the larger area of the air passages and few bends, and economy of fuel.

At one end is fixed a metallic joint, to allow for any difference of expansion between the external and internal pipes.

362. Patent Three-wheeled Omnibus, with Self-acting Break; G. and W. Richardson, 2, Copenhagen-street West, Islington, N.

363. Patent Indicator for Omnibuses; Francis Parker.

See Model, No. 73.

364. Fin-expanding Canopy for Carriages, &c.; T. L. Scowen.

See Model, No. 76.

365. Bathing and Swimming Sandals; J. Davis.

These sandals are designed to protect the feet while bathing, and also to assist in swimming.

366. Patent Elliottype Photographic Process; R. Elliott, Newcastle.

These photographs are the results of paintings made expressly for the purpose. The artist who wishes to produce an Elliotype picture paints the subject in white body colours upon one side of a piece of glass. When a sheet of sensitive paper, stretched on the other side of the glass, is exposed to the light, a copy of the painting, with the outlines softened, is produced. When sharp outlines are required, they are painted on the side of the glass placed next to the paper.

367. Patent Triangular Scales and Guages; R. E. Hodges, 44, Southampton-row, Russell-square, W.C.

The drawing represents a strip of wood or metal 10 inches long and 1 inch wide, with a diagonal cut severing it in two. Each inch is divided into 10, and the whole into 100 parts. Each move of the 10th of an inch of one triangle upon the other, whether backwards or forwards, must decrease or increase the width of the scale 100th part of an inch, and the scale will be parallel in the parts which overlap each other. The guage plate, Fig. 5, will give the diameter of needles, wire, screws, round iron, and lathe work, and also the thickness of paper, sheet metal, &c. Tubes (as gun-barrels) may be guaged internally from one end to the other by a simple arrangement of sections of these triangles.

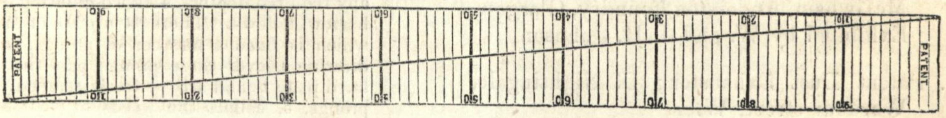
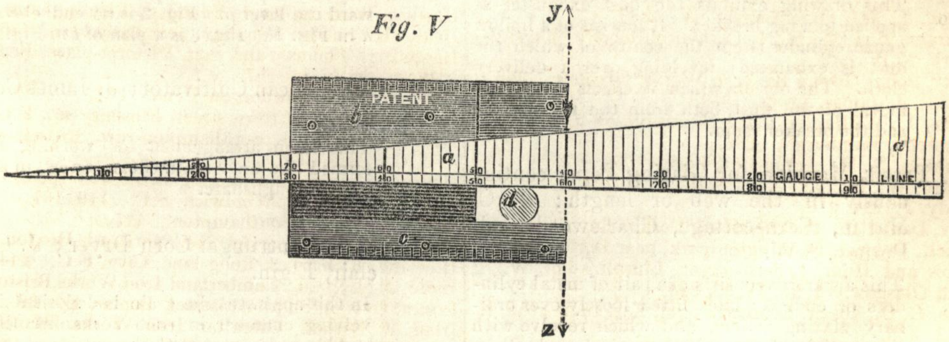


Fig. V



LIST OF EXHIBITORS.

N.B.—The figures after the names refer to the numbers in the Catalogue.

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